INDIA

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OCTOBER, 1948

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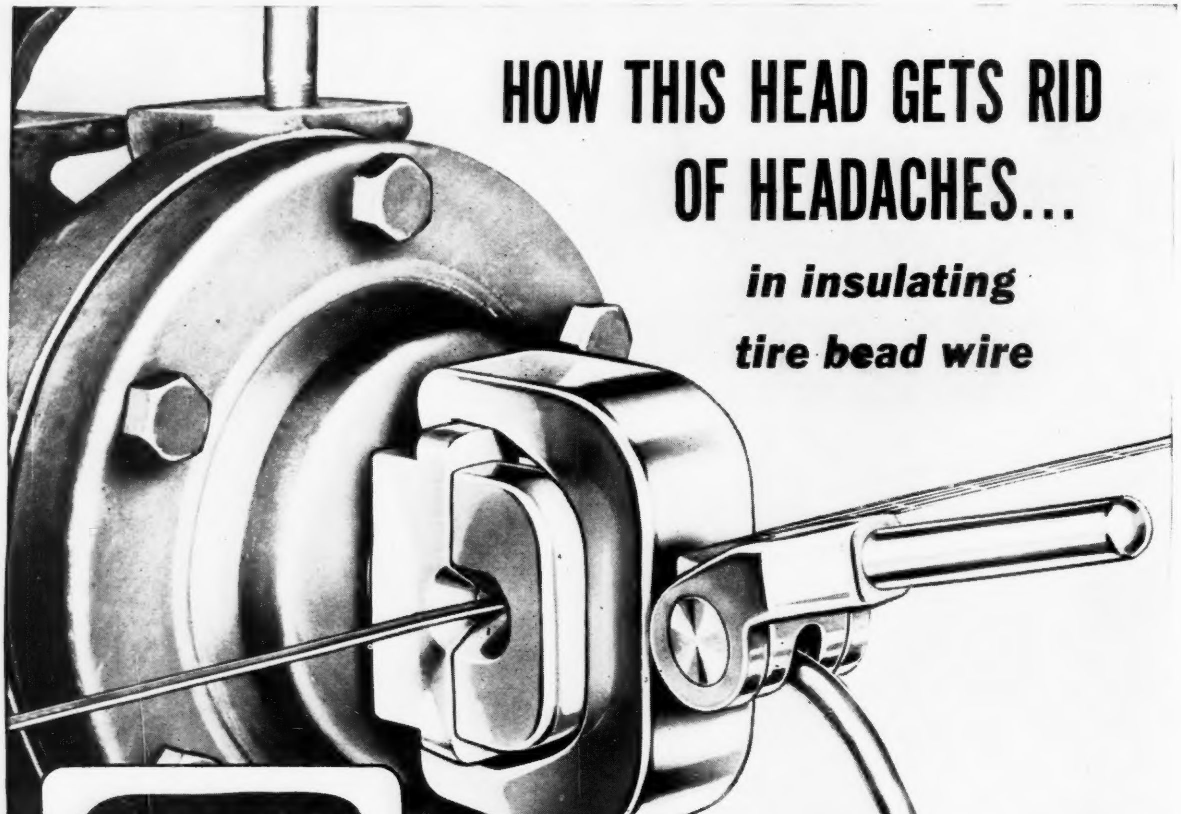

Enlarged section of insulated wire braid showing balanced coverage more consistently maintained with Frazier-type head.

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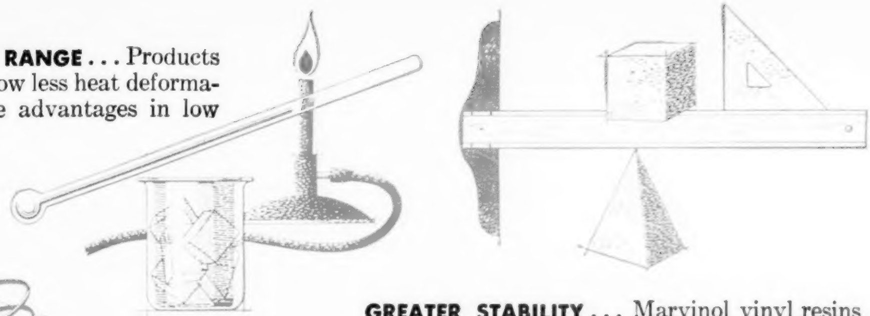

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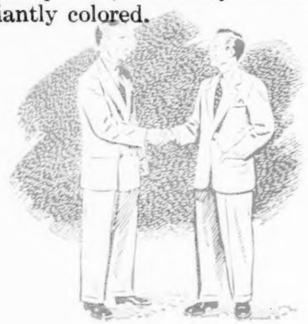

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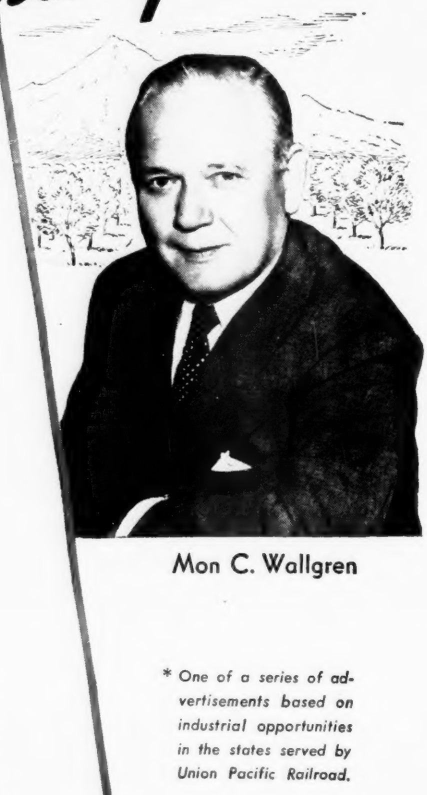

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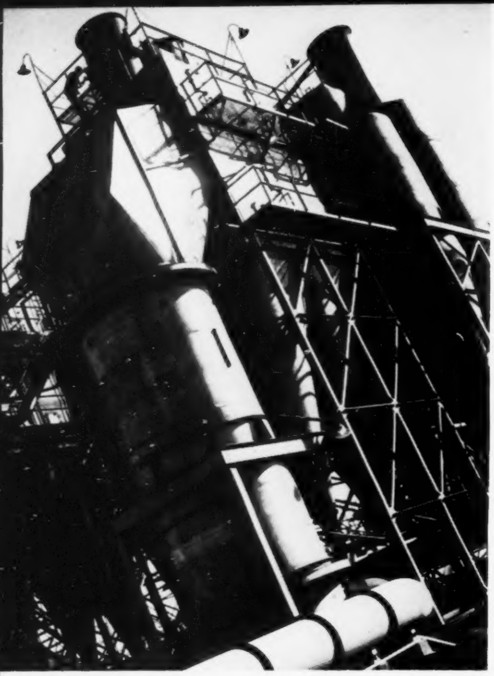

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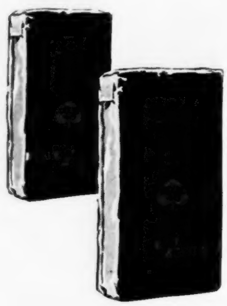

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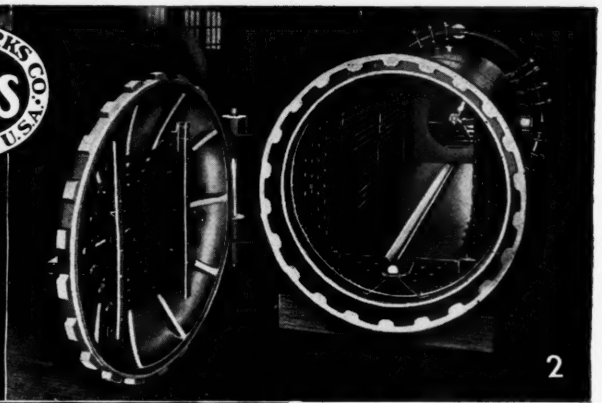
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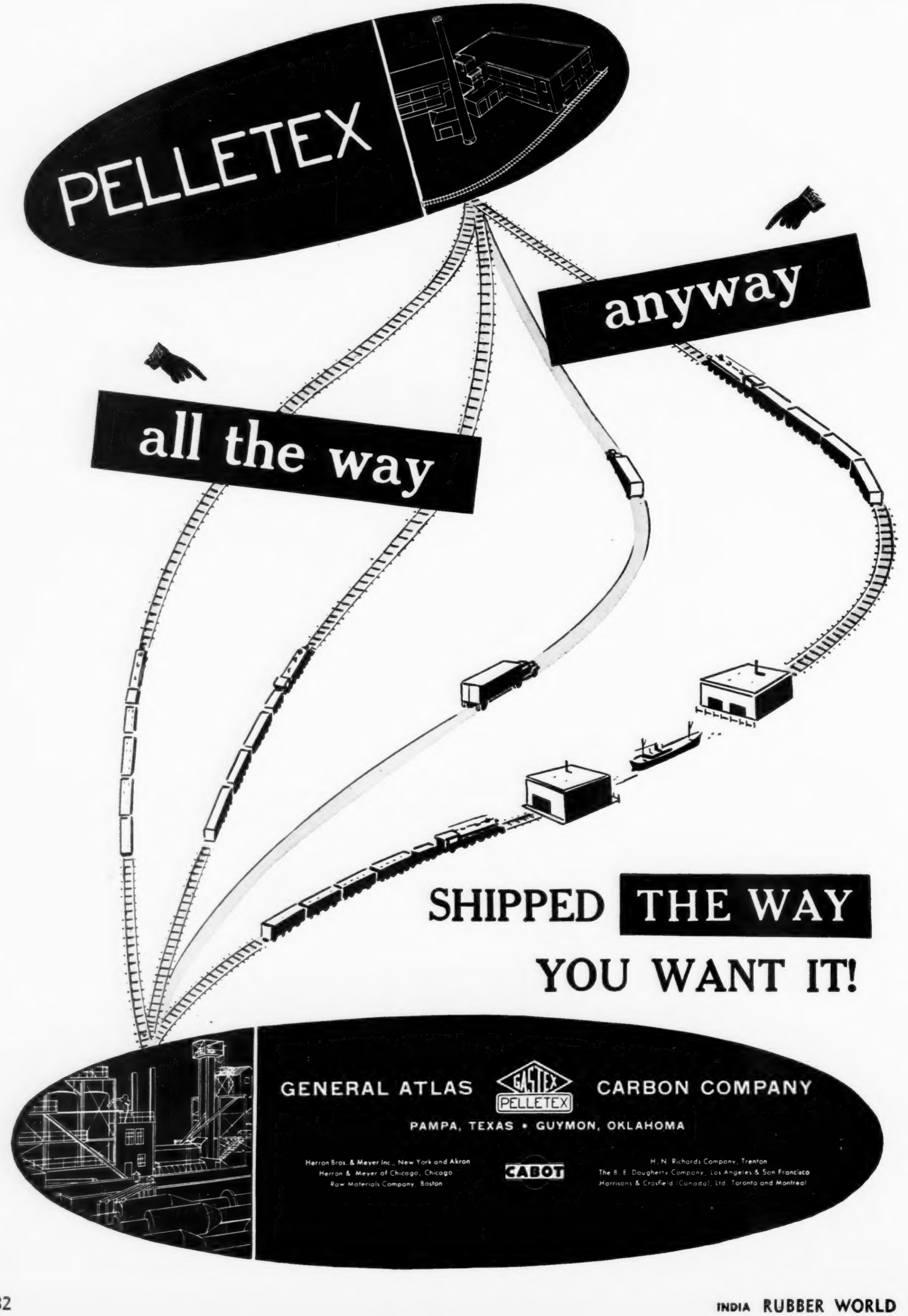
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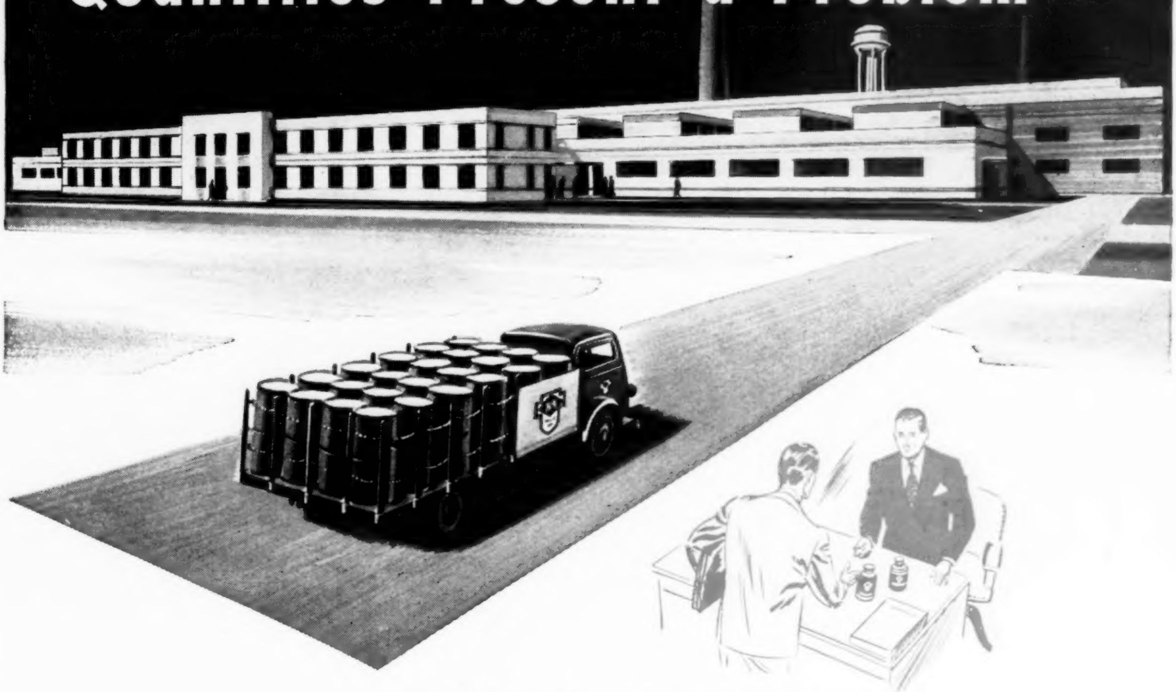

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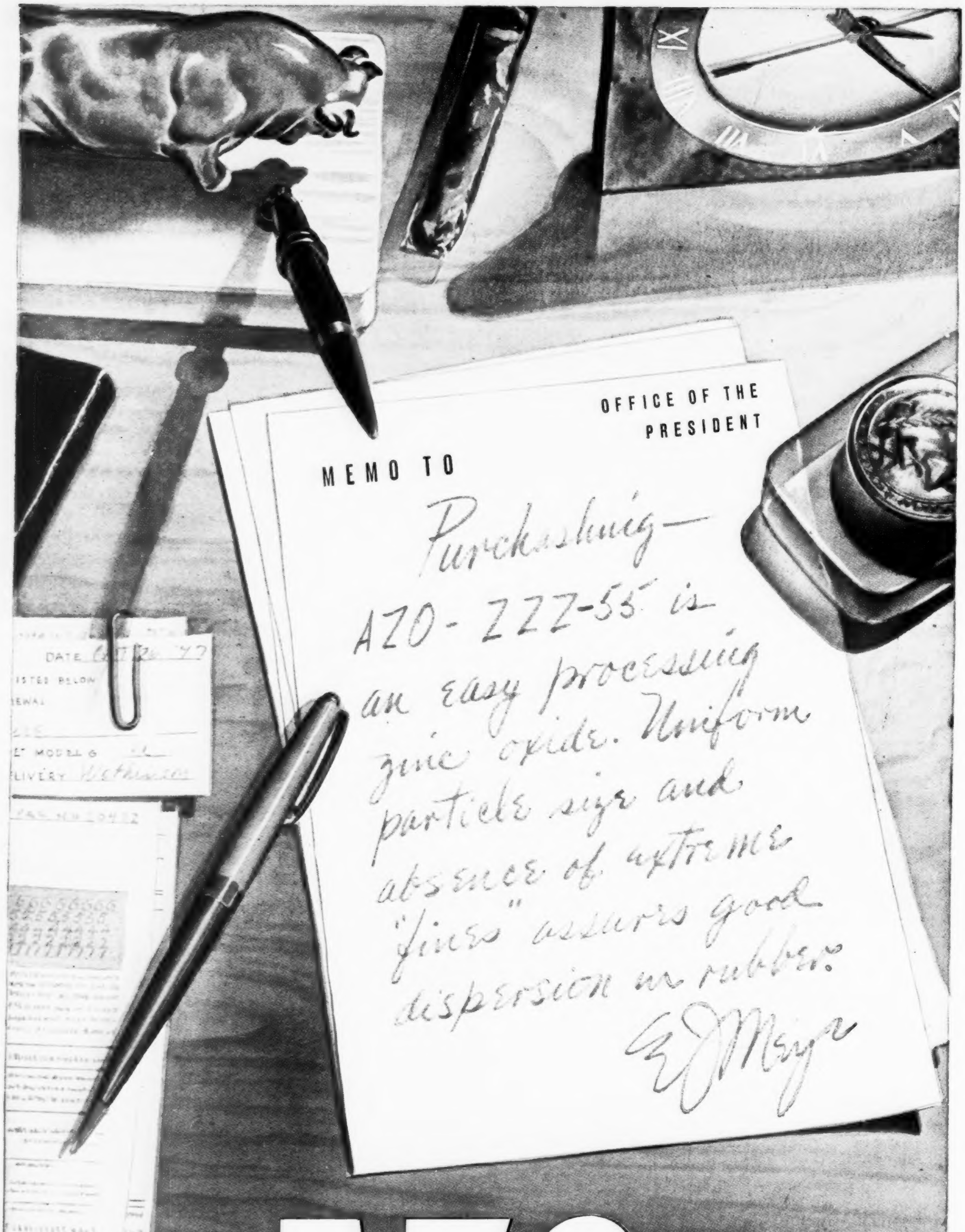
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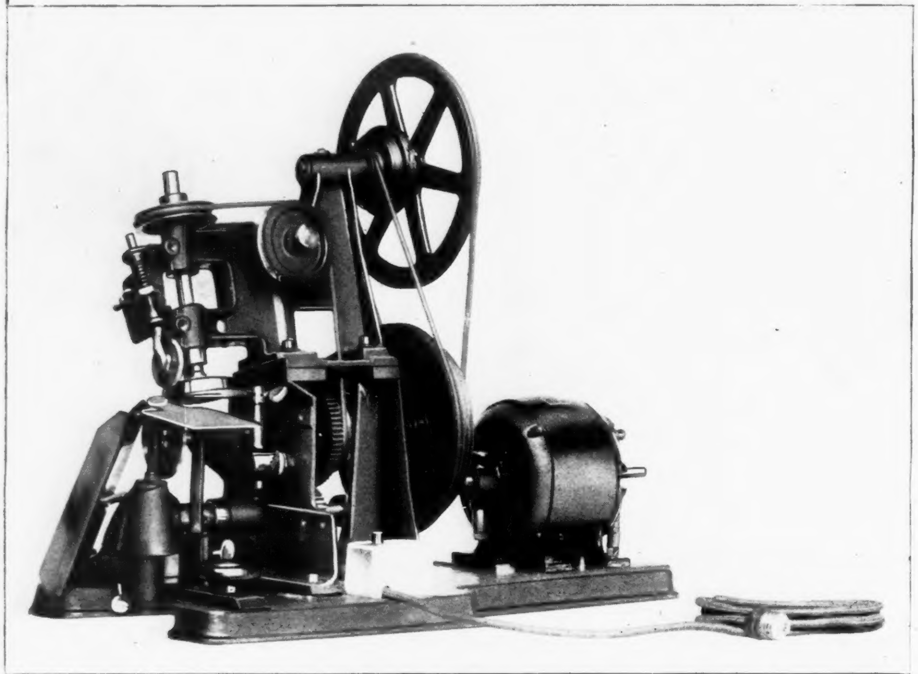

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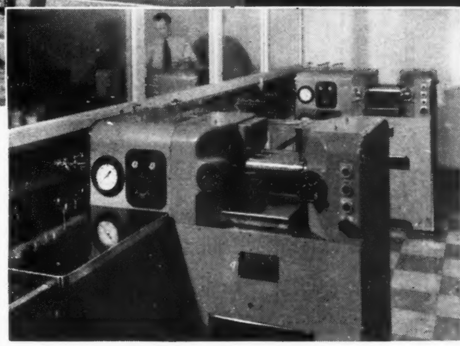

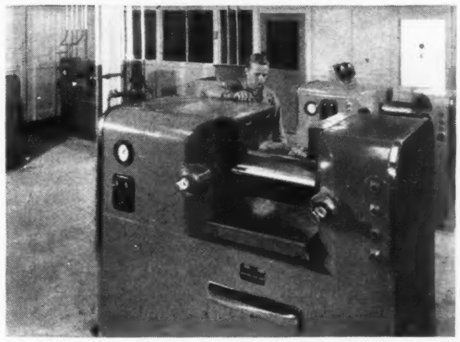

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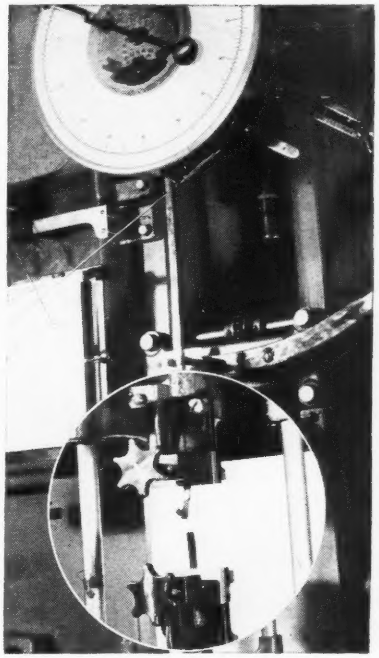

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October, 1948

Volume 115 Number 1

A Bill Brothers Publication

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MARKET REVIEWS Pages

STATISTICS

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Volume 119 New York, October, 1948 Number 1

Carbon pH and Structure in Rubber Compounding[1]

H. A. Braendle,[2] H. C. Steffen,[2] and J. R. Sheppard[2]

WHEN carbon reinforced tire treads first came into general use, carbon black grades were distinguished chiefly by their blackness and fluffiness. Neither attribute was received with any degree of grace by the rubber compounders. When organic accelerators came into use, it was found that channel carbons had a retarding effect on cure. This was traced to the adsorptive power of the black, but early adsorption studies seemed contradictory. From 1937 to 1945, Wiegand and the Columbian Carbon research laboratories disclosed in turn the pH effect of carbon black (1), the particle size and hence surface area of carbon black (2), the concept of carbon structure (3), and the persistence of reticulate carbon chain structure after milling into rubber (4). There developed from these studies a quantitative though still oversimplified system of describing carbon black qualities, designated the "Building Stones of Carbon Quality," viz., carbon surface, pH, and structure. Of these one (pH) is chemical in its nature, and the other two presently appear to be physical. A discussion of their role in rubber compounding naturally falls into two categories—vulcanization and reinforcement. These have been discussed broadly and comparatively by one of the authors for natural rubber and the commercial synthetics (5). The present paper is directed to a more specific treatment for natural rubber and GR-S.

Carbon pH

As prewar rubber-carbon black compounding was in the main built around carbon black of acid pH, there evolved certain accepted types and ratios of curative combinations which proved satisfactory in service. These were different from those generally used with non-carbon compounds, but since they had been reached through evolution rather than through a knowledge of the process of vulcanization, not too much thought was given to finding a reason for these differences; they were vaguely ascribed to the "presence of carbon black." Introduced before World War II fine, fully reinforced carbons of high pH (6) indicated the need of a revision of curative ratios. The war interrupted this work in natural rubber.

The rapid growth to full stature of the synthetic (GR-S) rubber industry called for what seemed to be impossible quantities of carbon black for its reinforcement. The expansion of the furnace carbon industry supplied the solution. Old process units were multiplied and modified, and new processes were introduced. These were all alike in one respect; they produced blacks of high, 8 to 10, pH. The rubber industry learned how to use the new furnace blacks while it learned how to process and compound the synthetic polymer (GR-S). Postwar development, even with the return of natural rubber, has not slowed down the demand for furnace carbons, and their proportion to total carbon black production continues to increase. This trend seems destined to go on. In addition the introduction of the newer postwar fine furnace carbon (7) is, for the first time, challenging the position of channel black.

High pH Carbons and GR-S Cure

In the reinforcement and vulcanization of GR-S the "carbon effect" is well recognized, and a carbon starvation point of 350 acres of carbon surface per 100 pounds of GR-S was demonstrated (8). The new fully reinforcing carbon (Statex K) is of such fineness that at the conventional 50% carbon to GR-S ratios for tire treads there is adequate surface for the carbon effect to be fully realized. However in the actual use of this type of fine furnace carbon its high pH raised a problem of cure rate. Thermal conductivity considerations have established minimum curing times for tires. For channel black-reinforced tires, cure has in the interest of mold turnover and cost been shortened close to this minimum. The use of faster curing fine furnace blacks, therefore, created rather than solved a problem. This situation is true for both GR-S and *Hevea* treads. The first approach to the taming, or deceleration of fine, furnace black treads seemed to be reduction of accelerator ratios. This led to accelerator starvation and loss of quality in the vulcanizate, e.g., poor modulus, tensile, and snap, a loss reflected in poor road performance in tires. An attempt to decelerate by curative reduction alone, as in Table 1, gave poor road wear rating.

This fine furnace (VFF) tread gave a mileage rating of only 75% that of the EPC control. Examination of the physical properties, as in Figure 1, shows deceleration was insufficient since in 30'/280° F. the furnace

[1] Presented before the Division of Rubber Chemistry, A. C. S., Chicago, Ill., April 22, 1948.
[2] Columbian Carbon Co., New York, N. Y.
[3] Numbers in parentheses refer to bibliography items at end of article.

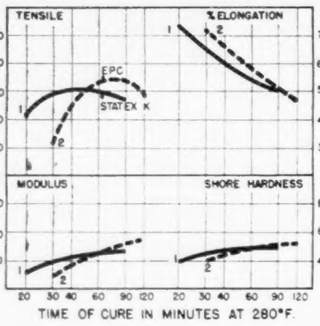

Fig. 1. GR-S Passenger Tire Treads

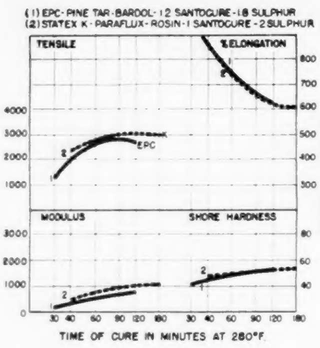

Fig. 2. Statex K *vs.* EPC in Standard GR-S Treads

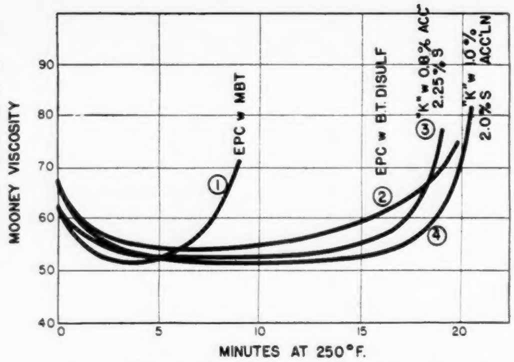

Fig. 3. Mooney Scorch at 250° F.—*Hevea* Treads

carbon tread had already passed its best properties and at the tire cure of 45′ 290° F. was badly overcured. Attempts to slow the cure of the furnace carbon tread by further reduction in acceleration resulted in serious loss of physical properties without attaining a satisfactory retardation. Actually, cure was spoiled rather than slowed.

Table 1. GR-S Passenger Tire Treads

GR-S	100	100
EPC	50	
VFF (Statex K)		50
Zinc oxide	3.5	3.5
Mineral rubber	5	5
Antioxidant	1	1
Stearic acid	1	1
Pine tar	2	2
Coal tar	3	3
Benzothiazyl sulfenamide	1.25	1.125
Sulfur	1.825	1.825

Obviously another approach was needed. Many expedients were tried; the use of retarding-type softeners showed promise. Increasing sulfur from the conventional ratios for GR-S of 1.6 to 1.9 to a full 2.0% or more also paid dividends in resilience and strength. The final compound selected for evaluation in service was:

Table 2

GR-S	100
VFF (Statex K)	50
Zinc oxide	3
Rosin	3
Neutral petroleum softener*	3
Stearic acid	1
Sulfur	2
Benzothiazyl sulfenamide	1

*Paraflux

This compound gave in the laboratory a curing pattern almost identical with that of the channel control, as illustrated in Figure 2. On the road this tire outperformed the channel control by 20%, thus showing about a 50% improvement over the earlier compound. Flex and cut performance were also greatly superior to that of the channel control.

With GR-S-10, which already contains rosin as a retarder, the formulation is similar. Two to 2½% of fatty acid seems indicated for cure and processing, and about 5% of a neutral petroleum softener of the Paraflux type is adequate. In general, GR-S-10 with furnace carbon requires more accelerator to match the curing rate of the GR-S-rosin combination shown in Table 2. Either of these combinations with Statex K surpasses the road wear of channel-reinforced GR-S treads by 15 to 20% and gives several-fold better flex and cut growth resistance.

High pH Carbons and Hevea Tread Scorch

In *Hevea* treads the problem was somewhat more serious since natural rubber treads of acceptable quality are more scorchy than their GR-S counterparts. Here again the economics of manufacture have added to the compounder's troubles. Speed-up of Banbury mixing and processing in the interests of lower cost has made it impossible in many factories today to process well-established prewar *Hevea* tread compounds. In Figure 3 are presented Mooney scorch data on factory processed passenger-type *Hevea* treads of the composition shown in Table 3 below:

Table 3

	EPC Controls		VFF Treads	
Compound =	1	2	3	4
Smoked sheets	100	100	100	100
EPC	50	50	...	...
VFF (Statex K)	...	...	50	50
Zinc oxide	3	3	3	3
Stearic acid	4	3	2	2
Pine tar	2	5	3	3
Rosin*	...	...	3	3
Peptizer†	...	0.25	...	...
Antioxidant‡	1.5	0.5	...	...
Antiflex§	...	1	2	2
Mercaptobenzothiazole	0.9	...	...	...
Benzothiazyl disulfide	...	1.0	...	...
Benzothizyl sulfenamide	...	...	0.8	1.0
Sulfur	2.7	2.75	2.25	2.0

*Staybelite Resin.
†RPA No. 2.
‡ BLE.
§Thermoflex A.

All compounds were run to full scale in the factory on regular processing runs using No. 1 Hard Smoked Sheets, thus presenting probably the extreme in scorchiness. Control #1 is a prewar type of channel carbon tread and in today's processing routine is too hot to handle in regular production. Control #2 represents an adjustment of compound found safe for high-speed production. Total softener has been raised two parts, and 0.25% of peptizing agent has been added. The acceleration has also been changed to a less scorchy type. The VFF compounds, #3 and #4, use rosin as a retarding agent and again carry two more parts of softener than Compound #1. The high pine tar ratio was necessary in this particular series because straight No. 1 smoked sheets were used in place of the usual blend of hard and soft gums. The acceleration is of the delayed action type. Further relief might also have been obtained by using a peptizing agent or a chemical scorch retardant, though, actually neither of these was needed in the particular factory setup where these treads were run.

Table 4. Comparison of Scorch Retarders

	Control No Retarder	Acid Retarder	Nitrosoamine Retarder
Smoked sheets	100	100	100
VFF (Statex K)	50	50	50
Zinc oxide	3	3	3
Stearic acid	2	2	2
Rosin	3	3	3
Sulfur	2.25	2.25	2.25
Delayed action accel	0.8	0.8	0.8
Salycilic acid	...	0.5	...
n-Nitrosodiphenylamine	...	...	0.5
Mooney scorch ° 250° F	17′	19′	21′
Rebound (%)	63	63	65
Modulus	Control	=1	+70 p.s.i.
Tensile	Control	=1	+75 p.s.i.

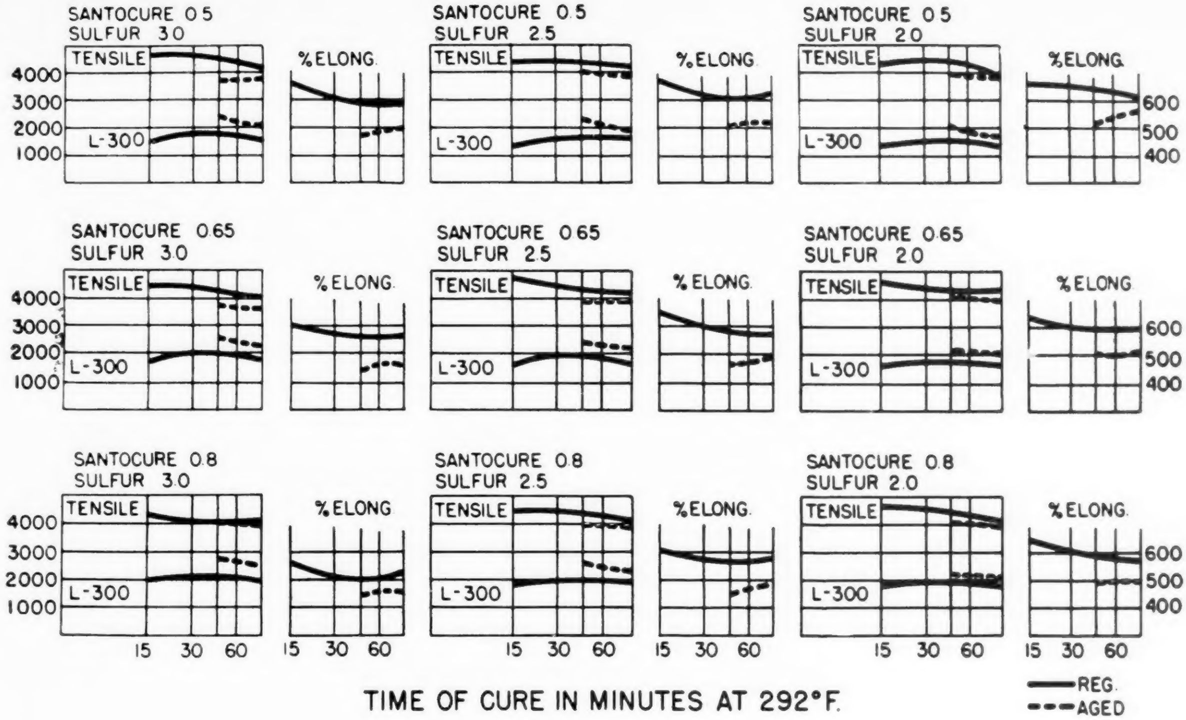

Fig. 4. Santocure-Sulfur Ratios with Statex K in *Hevea*

Of the chemical retardants which fall into two principal classes—organic acids and nitrosoamines—the latter seem preferable. They appear to give greater processing safety, and there is evidence that at curing temperatures they actually give an extra boost in cure. This is reflected chiefly in additional resilience or rebound. Typical of this effect is the series shown in Table 4.

High pH and Hevea Cure

As mentioned earlier, the introduction of a fast-curing fully reinforcing carbon for tire treads involved adjustment of curing rate to economical established curing rates rather than changing curing times and temperatures to fit the new carbon. As in GR-S, initial attempts by accelerator reduction alone were ineffective both in their failure to give adequate deceleration and to maintain good physical properties. Various accelerator sulfur combinations were tried. Typical of these is a series of compounds shown in Figure 4 (9). This covers a range of accelerator ratios from 0.5 to 0.8 with sulfur ratios of 3.0 to 2.0. The aged data are for the approximate equivalent of a factory cure and on through 100% overcure. It is apparent that for a VFF carbon of high pH (Statex K) in a *Hevea* tread base of high (3%) sulfur and low (0.5%) acceleration there is bad reversion—falling green and aged modulus, and increasing aged elongation. It is further seen that both decreasing sulfur (from 3% to 2%) and increasing acceleration (from 0.5% to 0.8%) improve quality by stabilizing overcures. The most stable compounds of the series are those with the lowest sulfur and the highest acceleration. This finding was in serious conflict with traditional belief built up with channel carbon-*Hevea* treads.

This series showed excellent tensile properties throughout with no indication of loss at the lowest sulfur ratio used. It was necessary to find how low a sulfur ratio could be safely used.

A base compound, as below, was mixed.

Smoked sheets	100
VFF (Statex K)	50
Zinc oxide	3
Stearic acid	2
Rosin	3
Benzothiazyl sulfenamide	1

To this were added in turn: 2.8, 2.0, 1.4, 1.1, 0.8, and 0.5 sulfur. Figure 5 suggests sulfur might safely be lowered to about 1.4%. T-50 determinations, however, (see Figure 6) on these stocks made it apparent that there might be danger in lowering sulfur much below 2.25%. This selection, a compromise one, rests on several considerations, primarily the fact that many prewar *Hevea*-channel treads were actually cured to a T-50 of —15° C. It was made with full knowledge of the fact that on changing pigment types and loadings, fixed T-50, like fixed modulus, is not a valid cure criterion. Tires road tested under standard test fleet conditions, however, gave 2.25% sulfur + 0.8% benzothiazyl sulfenamide a slight edge over 2.0% sulfur + 1.0% accelerator.

The problem of fast cure of furnace carbons has been approached from the angle of changing the carbon black as well as changing the base formulation of the rubber compound. Treatment of the carbon blacks with retarding agents has a number of objections, the most serious of which is the choice of a retarding agent acceptable to all compounders. Cost is also a consideration. Another approach explored was the addition of C_xO_y complexes to the carbon black surface, i.e., controlled oxygen addition to the carbon black surface, making it in that respect more nearly like the surface of channel carbons. Here again cost becomes a factor. There are further objections to the addition of oxygen to the carbon surface. Insofar as GR-S is concerned, the type of surface on furnace carbons seems to be the more desirable since, as pointed out by Winn *et al* (10):

"Carbon black is a catalyst for the oxidation of GR-S vulcanizates. The increased rate of oxygen absorption with increased loading is, however, a function of surface area rather than weight. Different types of carbons

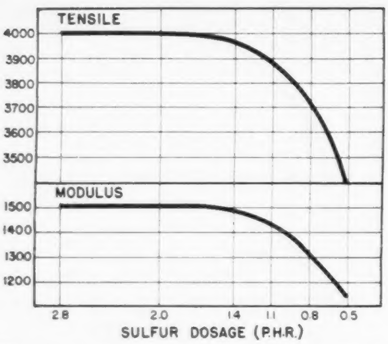

Fig. 5. Effect of Decreasing Sulfur Dosage on Physical Properties

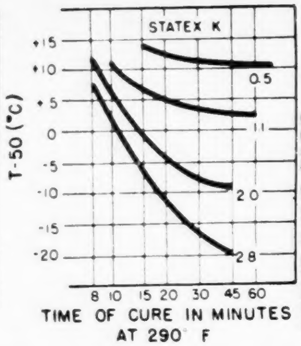

Fig. 6. T-50 of *Hevea* Treads at Different Sulfur Levels

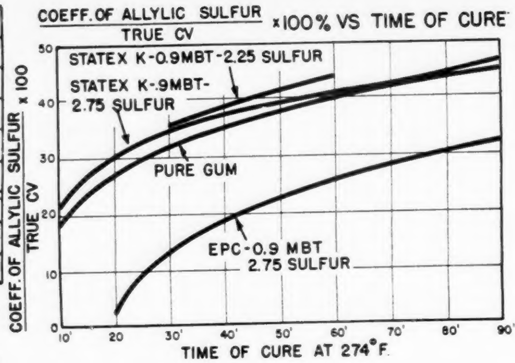

Fig. 7

show different degrees of activity for a given surface area; the furnace carbons studied were, for example, only 55% as active as channel black in promoting oxidation."

This, with the generally accepted belief that changes occurring in natural rubber during aging are primarily the result of oxygen attack, casts considerable doubt on the overall advantage of such an approach. Now that fully reinforcing furnace carbons free of the handicaps entailed by the presence of surface oxygen are available, it would seem to be a backward step to modify these carbons by adding to them those non-carbon impurities which gave channel carbons their high accelerator adsorption, slow curing, and bad aging behavior. The more reasonable approach seems to be to capitalize on the extra purity of the new carbons and by a review of the present state of knowledge of rubber vulcanization to devise new curative combinations aimed at better performance by the rubber phase of a black compound than was possible with channel carbons.

Following the leads of Armstrong *et al.* (11) and Hull, Olsen, and France (12), Cranor (13) has shown that in the presence of fine furnace carbon of high pH (Statex K), vulcanization proceeds by the same mechanism as in the pure gum base. This point is illustrated in Figure 7, drawn from detail data of the Cranor study. This illustrates further that as sulfur is decreased, the disulfide or allylic type of linkage persists.

Another example of the beneficial effect of driving home the smaller amount of sulfur by increased acceleration, specifically, better tensile and rebound follows:

Table 5

Smoked sheets	100	100
Statex K	50	50
Zinc oxide	3	3
Stearic acid	2	2
Pine tar	3	3
Rosin	3	3
Antioxidant	2	2
MBT	0.6	
Benzothiazyl sulfenamide		0.8
Sulfur	2.7	2.25
Modulus (L-300)	1200	1200
Tensile	3600	3750
Rebound (%)	61	64

These considerations have suggested that in the long run, probably the most beneficial approach is by way of compounding adjustment rather than by carbon surface modification lest there be lost the advantage in aging, type of vulcanizate, and flexcut resistance attainable because of the purity of the furnace carbon surfaces.

Using the following formulation:

No. 1 Hard Smoked Sheets	100
Statex K	50
Zinc oxide	3
Stearic acid	2
Rosin	3
Antioxidant	2
Pine tar	3
Benzothiazyl sulfenamide	0.8
Sulfur	2.25

satisfactory processing was obtained, and tires were road tested under standardized test fleet conditions as follows: A 6.50x15 tire was put on a car normally taking a seven-inch tire. An overload of 20% was used, and inflation was dropped from 28 to 26 pounds per square inch. This gave a severe flexing as well as abrasion wear test to the tire. The test car was run 60 m.p.h. on an all-pavement course in South Texas, using three shifts a day and piling up about 1,000 miles a day of road mileage. Two control tires and two experimental tires were alternated around the car for each test. At each 1,000 miles tires were rotated one position on the car. No test was considered significant until all tires had made at least two rotations around the car. In general either three or four rotations equivalent to 12,000 or 16,000 miles were run. So run, the new VFF carbon, Statex K, has demonstrated a rating of 105% of the channel reinforced controls. Its flex cut behavior has been outstandingly good since the overload and size (6.50x15 on a car originally taking 7.00x15) were such as to accentuate any tendency to crack.

Carbon Structure and Reinforcement

Carbon structure and fineness of particle or specific surface together reinforce rubber in the physical sense. In contradistinction, carbon pH affects the chemistry of vulcanization and through that the rubber phase of the compound. One of the authors has presented a review (5) of the comparative role of carbon structure in natural rubber and the commercial synthetics. He shows that in all the polymers whatever their peculiar vulcanization mechanisms, structure had similar stiffening and shortening effects. This point is in accord with the known behavior of fibrous materials in rubber. Structure carbons have become of such importance that it seems desirable to think of carbon structure as a new compounding ingredient and to assess its effects separately from carbon surface and pH. Like any other compounding ingredient, it will be used and abused until its role is thoroughly understood. The physical units of a high structure carbon, after milling into rubber, may be visualized as very fine fibers whose ratio of length to diameter is of the same order as, if not greater than, that of other known fibrous reinforcers. It seems almost superfluous to say that among carbon reinforced compounds it is no longer safe to use fixed modulus as a cure criterion when comparing carbons of varying degrees of structure development. Likewise, the danger of compounding out stiffness and modulus differences of structure carbons *vs.* non-structure carbons by other than carbon loading or softener or processing adjustment seems equally obvious. Attempts to lean on the mechanical support of carbon structure at the expense of good

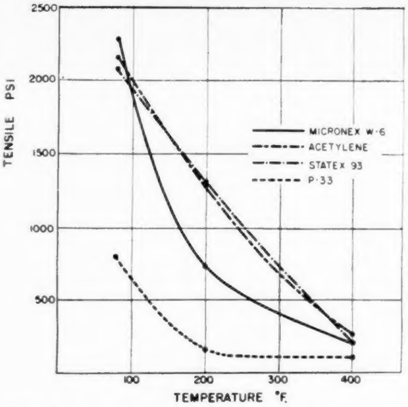

Fig. 8. Aged, Relaxed Tensiles *vs.* Temperature for Various Carbons

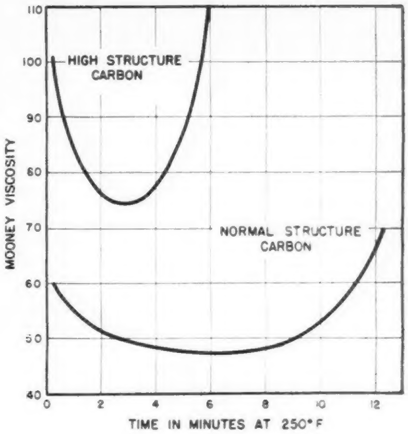

Fig. 9. Effect of Carbon Structure on Mooney Scorch of *Hevea* Treads

chemical cure would seem to be very risky. Likewise in T-50 and similar tests direct comparisons at fixed T-50, as a cure criterion of carbons with varying degrees of structure, are no more permissible than the comparison of fine and coarse carbons or the comparison of compounds with varying concentrations of pigment. To repeat, structure carbons are in essence carbon fibers. As such, their stiffening action, insofar as their length of fiber is concerned, is a mechanical one. The use of these carbons does not remove the necessity of a properly compounded and vulcanized rubber phase. Carbon structure is not a substitute for vulcanization, but a new compounding ingredient by which certain physical effects may be enhanced in both the uncured and the cured rubber.

As the role of structure in rubber and the technique of its addition to the carbon black developed, it became necessary to decide what amount of structure would give an optimum balance between benefits and handicaps and likewise greatest versatility of application. As an example of the sort of evaluation leading to such a decision, attention is called to one of the outstanding effects of carbon structure in GR-S. Structure carbons probably go farthest toward improving the otherwise notoriously poor hot strength of GR-S. This point has a definite bearing on the problems of flex cracking of tread stocks. In actual running of a tread, the rubber has been aged; it is hot from its own hysteresis, and it is softened or relaxed by the flexing of the rolling tire. To simulate these conditions test sheets were first oven aged, then flexed 10 times to within 75% of normal breaking elongation and then tested for hot tensile, using the hot iron test (14). Temperatures up to 400° F. were included in the series, and aged, relaxed hot tensiles were plotted against temperature of test, as in Figure 8. The advantage of the structure carbons (Statex 93 and acetylene carbon) over channel and fine thermal carbon is striking. Thus at 200° F. the structure carbons have a tensile strength twice that of channel carbon. It is also to be noted, however, that in going from a structure index (15) of about 130 for Statex 93 to about 300 for acetylene carbon there has been no further dividend in hot tensile. In this important property of hot tensile under tire service conditions excessive structure is not needed, and its handicaps of scorchiness of the raw stock and shortness of the cured compound need not be tolerated.

Carbon Structure and *Hevea* Tread Scorch

The problem of scorch of *Hevea* treads reinforced with furnace carbons, under current processing conditions, was commented upon as affected by pH. The scorch problem is another example of the desirability of optimum balance between fineness and structure in carbon black. In Figure 9 are shown Mooney scorch values for factory processed *Hevea* treads with two carbons of equal surface areas, but differing in their structure index (15) by 80%. It is thus obvious that carbon structure must be recognized as a factor not only in the final product, where its stiffening and hardening affect may be desirable, but also in its effect on the processing of the raw stock.

Carbon Structure in the Processsing of GR-S

In 1944, Wiegand and Braendle (16) pointed out that hot plastication of GR-S stiffened, shortened, and weakened the final tread compound; whereas cold refining of the raw polymer followed by cool laboratory milling softened, lengthened, and strengthened the resultant vulcanizate. At that time the authors recommended that high processing temperatures of GR-S be avoided. It was also recommended that "further study of the remedial effects of strenuous mastication or refining of GR-S tread type, carbon-reinforced stocks under low-temperature conditions" be investigated. In order to turn out the required production of GR-S, low temperature processing, as in the laboratory, has been impossible. Gelation, or cross-linking of polymer, was unavoidable, and it became necessary to learn how to cope with cross-linked rough processing rubber. Smooth processing was obtained by various means, high loading of coarse or acicular pigments, plasticizing softeners, etc. For carbon black reinforced stocks the very high structure blacks were probably the most effective for obtaining smooth extrusion true to die contour. It was also learned that best results were obtained if carbon black or other pigment was dispersed in the GR-S before softener was added. This practice not only gave smoother processing, but paid handsomely in quality of the final cured product because of the better dispersion of the carbon black.

The use of excessive amounts of plasticizing softeners and extenders has lost favor for compounds where physical quality specifications are high. From all this experience has come a belief whereby high benzol insoluble or gel content of GR-S and smooth processing are rationalized. Thus, at factory processing temperatures gel formation is well nigh inevitable, but if through the use of structure carbon or its equivalent, the viscosity of the mix is raised sufficiently, the gel is broken up into such small units that its deformation and retraction in processing, such as calendering or extrusion, are reduced to where it becomes negligible, and smooth processing results. With this understanding, alternative approaches suggest themselves. Garvey and Freese (17) in 1943 under the auspices of the Office of Rubber Director

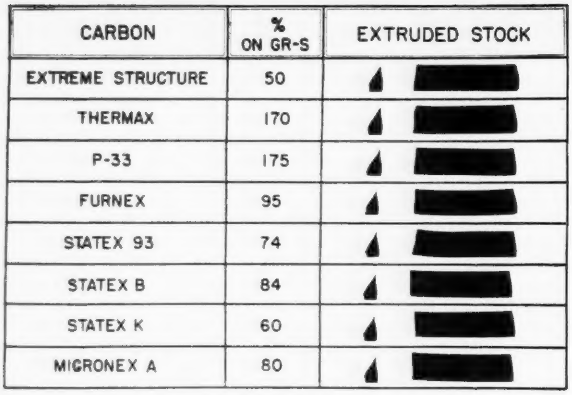

Fig. 10. Carbon Loading for Smooth Processing

studied the processing properties of various carbons and showed that smooth processing was a function not only of particle fineness, but also of loading and of some, then unidentified, peculiarities of special carbons. In confirmation of Garvey and Freese's findings on loading, Figure 10 illustrates the possibility of smooth processability of carbons ranging from MT to MPC through the adjustment of carbon black loading alone. These stocks all contained only GR-S and black. The loadings, Garvey ratings, rates of extrusion, and swelling indices are given in Table 6. The blacks are arranged in the order of fineness. The effect of added structure in stiffening the mixes and hence smoothing the extrusions is apparent. It is certainly not meant to imply that the various combinations of grade and loading are interchangeable for reinforcement effects, but they do suggest a review of existing compounds for possible volume cost savings, particularly through the use of carbons with good balance and fineness.

TABLE 6. CARBON-GR-S RATIOS FOR SMOOTH EXTRUSION

Carbon	Structure Index	Black Loading	Garvey Rating	Rate of Extrusion Ft./Min.	% Swelling
MT Thermax	58	170	15.5	16	94
FT P-33	73	175	15.6	16	79
SRF Furnex	110	95	15.8	17	54
HMF Statex 93	130	74	15.8	16	58
Extreme Structure HMF	180	50	15.8	16.6	66
FT Statex B	100	84	15.8	18.1	64
VFF Statex K	130	60	16	17	60
MPC Micronex A	100	80	15.8	18.1	58

In 1943, Columbian Carbon Co. (18) demonstrated striking improvements in heat and flex cut resistance of GR-S with maintained physical properties and hysteresis through high-carbon high-softener ratios. Carbon black shortages during the war reduced this discovery to almost theoretical interest only, except that Wheeler, Vance, *et al.* (19) and McMillan *et al.* (20) did demonstrate in tires on the road that better road wear and cooler running could be obtained by this approach with an HMF carbon than was obtained by the conventional EPC compounding. This point confirmed the forecasts by the laboratory tests in the Columbian release.

Combining the ideas of high-black high-softener compounding and balanced carbon properties there seems to be considerable possibility of compounding economy. These are particularly apropos since the stringency of supply of carbon black has been relieved at the same time that the rubber industry is moving into a more competitive market. In the mechanical goods field of less than full tread quality, possibilities are suggested by the following studies.

A series of GR-S-carbon black-softener masterbatches was prepared and tested for extrusion quality, as in Table 7.

TABLE 7. GR-S-SOFTENER-CARBON RATIOS FOR SMOOTH EXTRUSION

Carbon Grade:	Extreme Structure HMF	Statex 93						
Carbon (% on GR-S)	50	50	55	60	70	75	80	90
Saturated polymerized hydrocarbon*	6	6	7	8	12	14	16	20
Garvey rating	16—	13	14	16—	16	16	16	16
% swelling	157	205	199	180	158	144	142	135

*Paraflux

Five out of the seven combinations of Statex 93 and softener showed promising processing qualities. After selecting a 75-part loading of Statex 93, various softener ratios were compounded and evaluated for physical properties and comparative volume cost as in Table 8.

TABLE 8. COST AND QUALITY COMPARISONS OF MIXES OF GOOD PROCESSABILITY.

Carbon loading	50	75	75	75	75
Softener loading	6	6	8	10	12
Carbon Grade	Extreme Structure HMF	Statex 93			
L-300	1610	2470	2170	2020	1700
Tensile	2600	2675	2400	2450	2275
% elongation	480	315	345	400	445
Shore hardness	61	67	67	65	64
Log resistivity	9.4	7.3	6.9	6.9	6.6
Specific gravity	1.141	1.20	1.198	1.195	1.192
Pound-volume cost	15.41	14.87	14.71	14.55	14.39

Even this very limited series of compounds shows a wide range of physical characteristics to meet product specifications, all of which have processing characteristics equivalent to a Garvey die rating of 16 since they all contain less than the 14% softener ratio giving this rating with 75% Statex 93 in Table 7.

Similarly with the finer furnace carbons a balance of fineness and structure seems to offer advantages of wide applicability. In Table 9 a comparison in GR-S-10 of carbons at widely different structure levels is made. It is apparent that the modulus of either the EPC control or of the extreme structure carbon may be duplicated by loading adjustment of Statex K. The volume cost advantages of using a carbon of better balance between its properties are obvious.

Conclusions

(1) A fine particle furnace carbon has been produced which threatens to unseat channel carbon from its position of preeminence as a rubber reinforcer.

(2) The family of furnace carbons has in essence

(Continued on page 74)

TABLE 9. COMPARISON OF STATEX K (130% STRUCTURE) WITH A FINE FURNACE (180% STRUCTURE) CARBON IN GR-S-10

Carbon	EPC	Extreme Structure Fine Furnace	Statex K				
Loading PHR	50	50	50	52.5	55	57.5	60
L-300	1110	1600	1230	1480	1590	1650	1680
Tensile	2700	2770	2750	2850	2875	2875	2850
% elongation	555	450	555	520	495	485	475
Shore hardness	60	60	59	61	62	63	64
Log resistivity (min.)	9.3	6.4	5.5	5.2	4.9	4.8	4.7
Avg. detrition temp. ° F.	330	321	329	332	335	337	338
Garvey rating	7	14.1	14.2	14.3	14.5	14.6	14.6
Lambourn Abrasion* (Average of 3 cures) Resistance rating, %	100	110	110	110	112	113	114

**Trans. Inst. Rubber Ind.*, 4, 210 (1928).

The Rubber Industry in the Detroit Area

G. M. Wolf[3]

IN VIEW of the meeting of the Division of Rubber Chemistry, A. C. S., in Detroit, Mich., November 8-10, this article on the rubber industry in that area by one of the members of Detroit Rubber & Plastics Group, Inc., should be of special interest. EDITOR.

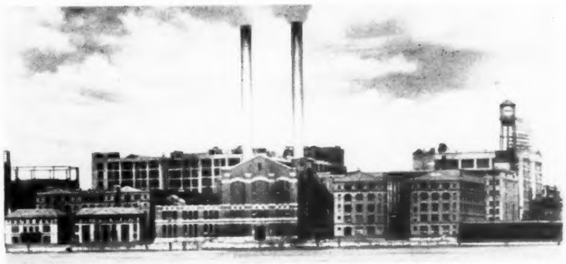

Fig. 1. The Detroit Plant of the United States Rubber Co., as viewed from the Detroit River

DETROIT, the automobile center of the world, is also the largest buyer of rubber products. The advancement and growth of the modern automobile has been partially dependent on the development of the pneumatic tire and of numerous automotive rubber parts. To this end the rubber industry has always looked to Detroit for increased outlets for its products and to the adoption of new and improved rubber materials. The rubber manufacturers have always shown a keen interest in Detroit by maintaining efficient and accommodating branches, dealers, and jobbers. Likewise, the rubber industries located in Detroit have made no small contribution in fulfilling the needs of the city's major industry.

It is interesting to note that approximately 75% of the rubber consumed in the United States is used in the manufacture of tires and tubes, which accessories account for by far the major portion of the rubber used on an automobile. Since the manufacture of tires is such an important phase of the tire industry and since the principal plant of the tire division of one of the largest rubber companies is located in Detroit, the history of this company is presented first.

United States Rubber Co.'s Tire Plant

The principal plant of the tire division of United States Rubber Co. is located in the City of Detroit. A group of 20 separate buildings, only 2½ miles from the heart of the city, occupies more than 20 acres of land between Jefferson Ave. and the Detroit River. It is probably the largest industry in the City of Detroit which lies so close to the geographical center of the city.

In normal times the capacity of the plant has a production in excess of 10,000,000 tires annually. The number of people employed is approximately 10,000, and for many years the plant has operated continuously on a 24-hour daily basis. Indications of the magnitude of the plant are reflected in its powerhouse activities in which the amount of coal consumed exceeds 700 tons a day. The daily electrical output is in the order of 330,000 kw. hours. An additional 105,000 kw. hours is supplied by the Detroit Edison Co. A powerhouse of this capacity is capable of functioning as a public utility for a city having a population of more than 100,000. Water consumption is in excess of 20,000,000 gallons a day, and daily steam generation is upward of 11,000,000 pounds. Compressed air is generated to the extent of 10,000,000 cubic feet a day.

The history of the Detroit plant began 65 years ago in 1883 when a group of men started to manufacture rubber goods in a single room in a building on West Lake St., Chicago. The originators of these operations were Fred W. Morgan and Rufus Wright. In 1891 the company perfected and placed on the market the first double-tube pneumatic bicycle tire, and demand for this type of tire grew rapidly. In 1893 the firm was incorporated under the name of Morgan & Wright. The bicycle business was very successful, and at about that time the mechanical goods line, which previously had constituted the main production, was dropped entirely. The small business of Morgan & Wright grew until in 1898 it was conducting a business of more than $1,000,000 a year. The biggest part of this business was in connection with the manufacture of solid cushion vehicle tires. In the year 1905 the Morgan and Wright interests were sold to the United States Rubber Co.

Shortly after the acquisition of Morgan & Wright by U. S. Rubber consideration was given to the expansion of production. At this time there were indications that there would be an extensive replacement of the horse and buggy by the automobile and that the center of activity of the automobile appeared to be in Detroit. With this foresight the management made arrangements for the acquisition of property and of the transfer of their business to Detroit. In 1905 the first parcel of real estate on the Detroit River was acquired. This consisted of 5.80 acres. In the same year a program began for the construction of buildings which were completed in the Fall of 1906. At that time all the manufacturing facilities of Morgan & Wright were moved from Chicago to Detroit. As soon as the company was established in these buildings, it employed nearly 4,000 people on a production capacity of 10,000 tires a day.

Since 1906 acquisitions of real estate amounting to some 15 acres were made. During 1939 the operation of the plant proceeded along normal lines having as its principal production item pneumatic tires. There is also associated with the tire plant at Detroit a motor products division devoted principally to the manufacture of rubber products as used in the automotive field. This includes steering wheels, motor mountings, and numerous other rubber items useful in that field. One of the principal products outside of normal peacetime activities related to the manufacture of caterpillar tank track assemblies. This also included the manufacture of bogie wheels. A second principal product of wartime application was the manufacture of bullet-sealing fuel cells.

During the critical years of 1939-44 the productivity results at the Detroit plant followed a course in radical departure from normal operations. These are reflected in a few overall statistics illustrating total production figures, as follows:

[3] Sharples Chemicals, Inc., Wyandotte, Mich.

Year	Pneumatic Tires	Solid Tires	Tonnage in Lbs.
1939	9,770,860	10,584	273,191,012
1940	10,281,460	13,762	293,018,019
1941	9,699,636	42,845	315,386,766
1942	2,464,168	141,636	188,344,270
1943	2,862,224	212,411	259,145,315

The substantial reduction in pneumatic tires was due to the discontinuance of non-essential civilian tire production. The low pneumatic tire production in 1942 and 1943, nevertheless, is somewhat compensated for by a substantial increase in heavy-service tires principally for military use. The increase in solid tires is due to the manufacture of bogie wheels for tank tracks. The tonnage production in the last column includes items other than tires. For example, tank track blocks and bushings are included under this heading, and also substantial weights of metal parts are included with the tracks.

In these years of 1939-46 the company increased the production facilities of its tire plants approximately 30% above that of any previous time in the history of the company. Its Detroit plant now has a daily capacity of 35,000 tires and employs 10,000 people. In order to give some idea of the quantities of materials used daily, some interesting figures are tabulated:

DAILY CONSUMPTION—DETROIT PLANT

	Lbs.
Natural and synthetic rubber	630,000
Cotton	66,000
Rayon	58,000
Carbon black	150,000
Zinc oxide	42,000
Sulfur	12,000
Stearates	11,500
Bead wire	30,000

The research and development on tires, tubes, and automotive rubber parts of the tire division of U. S. Rubber is done in Detroit. Employed in this work are 565 people, of whom 145 are graduate chemists, chemical engineers, and physicists. The director of development is A. W. Bull, well known in the Detroit Section of the American Chemical Society. The development of new products and the quality of U. S. tires are dependent upon this major division of United States Rubber Co.

Other Detroit Companies

Many of the smaller companies in the Detroit area have contributed in no small way to the development of adhesives and cement, insulated wires and cables, rubber-coated metal products, mechanical goods, including extruded, injection, and standard-type compression molded parts, as well as many automotive rubber parts.

St. Clair Rubber Co.

Two prominent manufacturers of adhesives and cements are located in the Detroit area. The St. Clair Rubber Co., established in 1923, has a factory at Marysville, Mich., with the main office in Detroit. This company not only manufactures latex and rubber cements, but also a variety of rubber products and rubber-proofed goods including artificial leather and automobile fabrics, tire repair materials such as camelback, and utility soles.

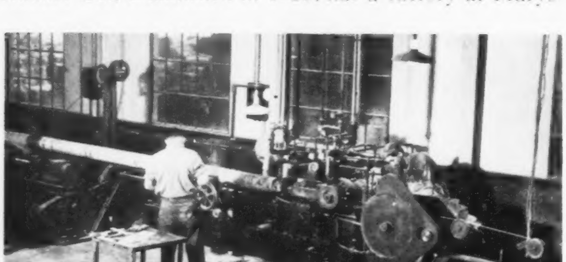

Fig. 2. Continuous Vulcanization of Insulated Wire at Electric Auto-Lite Co.

Minnesota Mining & Mfg. Co.

The adhesive division of Minnesota Mining & Mfg. Co. was established in Detroit in 1936. The products which have been made since that time have largely comprised adhesives and sealers. When the plant was first established, the output was approximately 125,000 gallons a month. Business has grown steadily, and present production amounts to approximately four times the original volume.

Electric Auto-Lite Co.

The Electric Auto-Lite Co. has a wire and cable division in Port Huron, Mich. This company, one of the world's largest independent manufacturers of automotive starting, lighting, and ignition equipment, has expanded its scope to include the automotive and aircraft insulated wire field. The plant has a daily capacity of 2,000,000 feet of wire, in which 150,000 pounds of copper are handled in the drawing machine frequently running at the rate of 5,000 feet a minute. Twenty thousand pounds of cotton, silk, or glass covering are consumed in a week.

Collord, Inc.—Paramount Rubber Co.

In 1933, Collord, Inc., was established, utilizing latex rubber for dipping and coating operations. The company's specialty is seamless rubber linings for tanks, pipe, ventilating systems, and dipped metal articles.

Fig. 3. Operators Applying Sheet Rubber To Slurry Agitators and Acid Tanks at Paramount Rubber Co.

In November, 1938, Paramount Rubber Co. was formed to take over the coating department developed by Collord, Inc. Originally all the operations at Paramount were based on the use of latex rubber for sprayed tank linings, rubber coated plating racks, rubber lined pipe, fittings and valves, and Rug Kling, a latex-coated mesh rug underlay. In 1939, foreseeing that latex would be in short supply, the company decided to purchase dry rubber processing equipment, and in early 1940 operations began on molded rubber goods and sheet tank linings. In 1942 latex rubber processing

was discontinued almost entirely, and dry rubber processing was diverted from natural to synthetic rubber. In 1943 the Taylor Engineering & Machine Works was purchased as a necessary adjunct for the manufacture of rubber molds and fixtures. Also in this year Paramount Rubber Co. was purchased by Legrand Daly, who consolidated his plastic manufacturing business with the present enterprise. Present products are manufactured from rubber and plastics and follow the prior general trend in that they are primarily intended for heavy industrial use.

Automotive Rubber Co.

Another firm which deals primarily with latex dipped and sprayed specialties is Automotive Rubber Co., which was founded in 1937.

Chemical Products, Inc.

Chemical Products, Inc., established in 1933, compounds natural and synthetic rubber cements, adhesives, and coatings for the automotive, appliance, and allied fields. This firm also specializes in sound deadening formulations.

Baldwin Rubber Co.

One of the oldest mechanical goods manufacturers in the Detroit area is the Baldwin Rubber Co., located at Pontiac, Mich., and incorporated in 1923. This company specializes in automotive floor mats, of which it is one of the largest single producers. Baldwin also has specialized in the manufacture of food gaskets. Although the above-mentioned items make up the majority of Baldwin's production, molded rubber goods and extruded products are also manufactured. Normally the company employs approximately 1,200 workers.

During the war, Baldwin produced more civilian gas masks than all other rubber companies combined. It was also a large manufacturer of bogie wheels, tank blocks and pins, gas masks and containers.

Detroit Gasket & Mfg. Co.

Another mechanical goods rubber company established in 1923 is the Detroit Gasket & Mfg. Co., which specializes in packings, refrigerator specialties, sheet and slab rubber, and weather stripping.

Wolverine Fabricating & Mfg. Co.

The Wolverine Fabricating & Mfg. Co., Inc., W. Fort St., which also operates a branch plant at Inkster, Mich., manufactures cork and rubber specialties.

Monroe Auto Equipment Co.

One of the most interesting rubber companies in this area is the Monroe Auto Equipment Co., in Monroe, Mich. This company is primarily a manufacturer of ride-control equipment such as shock absorbers and sway or stabilizer bars for the automotive industry. In connection with these items, many rubber parts reached such proportions that it appeared desirable for the company to enter the rubber manufacturing business.

In late 1942 an agreement was made with Chrysler Corp. whereby Monroe Equipment was permitted to develop, build, use and sell equipment for the injection molding of rubber under United States patent No. 2,402,805 assigned to Chrysler Corp.[2] In early 1944 the first 200-ton injection molding press was completed, and experimentation started. This was followed by the acquisition of a 250-ton press and six 450-ton presses installed at Hillsdale, Mich.

These presses are representative of a new conception of rubber molding. With this equipment finer dimensional tolerances are maintained in production and at the same time a much greater capacity per mold is achieved. Production molds are 24 by 24 inches in size, and a complete cycle of filling and curing ranges from three to five minutes. Normal compression molding would use 20 to 60 minutes for the same parts.

In setting up the Hillsdale plant it was necessary to provide compounding facilities. Here again Monroe Auto Equipment is doing something new and different by installing the first "millless" mill room.[3] Mixing is done in a No. 11 Banbury, and the complete batch is dumped directly into a pelletizer rather than on a sheet-off mill. From the pelletizer the pellets are automatically conveyed through spray coolers and drying zones and are eventually discharged to hoppers over the molding machines. The pellets flow by gravity into the injection head, and the rubber is then forced into the mold. The net result is that the rubber is not manually handled from the time it enters the Banbury until the time the finished vulcanized part is removed from the mold. This system of handling may become the mill room of the future and has excited considerable interest in the rubber industry.

Yale Rubber Mfg. Co.

Perhaps the youngest rubber company in the Detroit area is Yale Rubber Mfg. Co., organized 3½ years ago, at Yale, Mich. At present it employs 150 men and women. The products manufactured include druggists' sundries, rubber gloves, mechanical goods, sporting goods, stationers' goods, and miscellaneous specialties. In addition to the plant at Yale a sales office and warehouse are maintained at 1433 Holden Ave., Detroit.

American Felt Co.

A combination of felt with natural and synthetic rubber has formed the basis of three specialized products of American Felt Co. A sheet laminated, felt base packing and sealing material, known as Vistex, has extensive use in the form of packing washers for hydraulic shock absorbers and hydraulic shimmy dampeners for the tricycle landing gear of large aircraft. One of the company's more recent developments, a chamois-like material known as Feltan, is felt impregnated with natural or synthetic latices, resins, and the like. Its principal use is as a non-slip surfacing material for felt vibration mountings. Oil Foil bearing seal washers complete the third felt-rubber specialty product.

Acknowledgments

The author wishes to acknowledge the information furnished him by W. G. Nelson, of U. S. Rubber; F. J. Wehmer, Minnesota Mining; W. F. Dobbins, Electric Auto-Lite; T. McGuane, Collord, Inc.; E. J. Post, Paramount Rubber; R. L. Redmond, Automotive Rubber Co.; E. J. Kvet, Baldwin Rubber; D. F. Fraser, Monroe Auto Equipment Co.; E. H. Henderson, Yale Rubber; and W. H. Lehmberg, of American Felt Co.

[2] India Rubber World, June, 1948, p. 357.
[3] *Ibid.*, June 1941, p. 35; July p. 29; Aug., p. 32.

Chile Rations Inner Tubes

As a result of decreased domestic production of inner tubes, the Chilean Government decided as of May 31, 1948, to ration not only locally manufactured, but also imported inner tubes of all sizes.

Impact Resistant Resin-Rubber Blends[1]

H. S. Sell[2] and R. J. McCutcheon[2]

DURING the course of the past two years the use of high styrene copolymer resins as reinforcing and hardening agents for stocks of GR-S, natural rubber, nitrile rubber, and neoprene has gained widespread acceptance within the rubber industry. In this classification of high styrene copolymer resins are found resins which have styrene-diolefin ratios ranging from 70% styrene to under 95% styrene. The general properties and uses of these resins in rubber compounds have been discussed in the literature.[3]

All previous publications have dealt with relatively low resin loadings, based upon the rubber hydrocarbon in the batch. These applications have involved the use of the resins as modifying agents in articles characterized by their flexible properties such as flooring, shoe products, insulation, and allied products. While these applications using high proportions of rubber and low proportions of styrene copolymer resin were thoroughly investigated, using the resin as a hardening and reinforcing agent for the rubber, the region of very high resin stocks was scarcely considered.

This investigation undertook to study the possibilities in this field of high resin stocks. Because of the compatible nature of the styrene copolymer resin with many of the common rubbers, it presented the possibility that high resin-low rubber stocks could be prepared, using the rubber as a plasticizer for the resin, which might combine the characteristics of both the rubber and the resin and result in an improved resin-type stock. In addition, the unsaturation of both the resin and the rubber would permit vulcanization of this type of stock.

Effect of Plasticizing High Styrene Copolymer Resin

Table 1 illustrates the type of stock and the influence on the physical data resulting from the plasticizing of the high styrene copolymer resin with natural rubber. In this case Pliolite S6[4] is used as a typical example of a high styrene/butadiene copolymer resin.

TABLE 1. PROPERTIES OF UNCURED HIGH STYRENE RESIN-NATURAL RUBBER BLENDS

Pliolite S6	100.00	80.00
Natural rubber		20.00
Notched Izod impact resistance, in.-lbs.*	2.5	32.5
Heat deformation point °C†	52°	51°
Durometer hardness Shore D‡	78	68

*ASTM D256.
†ASTM D648.
‡ASTM D676.

It can be seen from the data presented in Table 1 that by plasticizing the resin with a suitable rubber, a stock can be prepared which not only possesses the tough and rigid properties of the resin, but also exhibits excellent impact resistance, a property usually lacking in resin-type stocks. Those familiar with the high styrene copolymer resins know that a strip of resin at 0.070-inch gage will shatter when bent or struck sharply. The low impact value of the resin stock in comparison with the much improved impact resistance of the resin-rubber blend is shown by these data. While this high impact strength has been achieved, it will be noted that there has been negligible change in heat deformation point and only a moderate decrease in durometer hardness.

Effect of Cure upon Resin-Rubber Blends

The unsaturation of both the rubber and the resin suggested that better physical properties might be obtained by covulcanization. The physical data obtained on the compounded and cured stocks shown in Table 2 indicate this point to be true. Although the uncured resin-rubber blend showed vastly improved impact resistance over the resin alone, it was found that compounding and curing the blend resulted in even greater impact resistance. Besides, an uncured resin-rubber blend which has poor resistance to tearing or breaking on bending or flexing is materially improved by the vulcanization. The curing also has caused an increasae in the hardness of the stock, making it approach the hardness of the resin itself. These and other effects of curing are shown in Table 2.

TABLE 2. EFFECT OF CURING RESIN-RUBBER BLENDS

Stock	A	B	C	D
Pliolite S6	75.00	75.00	75.00	75.00
GR-S	25.00	25.00	25.00	25.00
Silene EF	....	....	30.00	30.00
ZnO	....	5.00	....	5.00
Stearic acid	....	2.00	....	2.00
Benzothiazyl disulfide*	....	1.00	....	1.00
Tetramethyl-thiuram disulfide†	....	.12	....	.12
Sulfur	....	2.00	....	2.00

*Altax.
†Methyl Tuads.

Stocks cured 40'/290° F.				
Tensile strength, #/in²‡	3200	4360	3215	3550
Ultimate elongation,%‡	30	40	10	0
Durometer hardness (Shore D)	72	74	74	77
Unnotched impact resistance, in-lbs.	59	100+	32	53
Stiffness in flexure§, in-lbs.¶	‖	3.84	**	4.92
Compression strength, #/in²	4160	4720	4520	4600

‡ASTM D530.
§Moment (load in pounds x span in inches) necessary to produce 90-degree bend in a 1-x 0.075-x 4-inch section. Measured with Olsen stiffness tester.
¶ASTM D747.
‖Broke at 50-degree bend and 3.12 in.-lbs. moment.
**Broke at 55-degree bend and 3.72 in.-lbs. moment.

The data in Table 2 indicate the weakness of the uncured stock to bending. Both the loaded and the unloaded stocks in the uncured state failed by breaking when subjected to a bend of 50 to 55 degrees: whereas the stocks in which the rubber and the resin have been cured together do not fail on 90-degree bend. These cured stocks can be bent double without cracking or breaking, but they do assume a permanent set when subjected to this amount of stress. Actual angular deflection *versus* load plots for the stocks in Table 2 are shown in Figure 1.

These data also show the increase in tensile strength and compression strength in the GR-S impact stocks when cured. The hardness, being largely a function of the resin, is increased only slightly by the curing. This condition would indicate that resin-rubber impact blends can only be used in the uncured state in heavy, thick sections where no flexing is involved. For applications subjected to some bending or flexing action it is necessary to cure the resin and the rubber together.

Variations in Resin-Rubber Ratios

Impact resistant stocks can be produced over a wide range of resin-rubber blends. In general, the greater the amount of plasticizing rubber used, the greater the im-

[1] Presented before the Rubber & Plastics Section, Chemical Institute of Canada, Montreal, P. Q., June 9, 1948.
[2] Chemical products development division, Goodyear Tire & Rubber Co., Akron, O.
[3] Borders, Juve, Hess, *Ind. Eng. Chem.*, 38, 955 (1946). Thies and Aiken, *Rubber Age (N. Y.)*, 61, 51 (1947).
[4] Trademark registered, Goodyear Tire & Rubber Co.

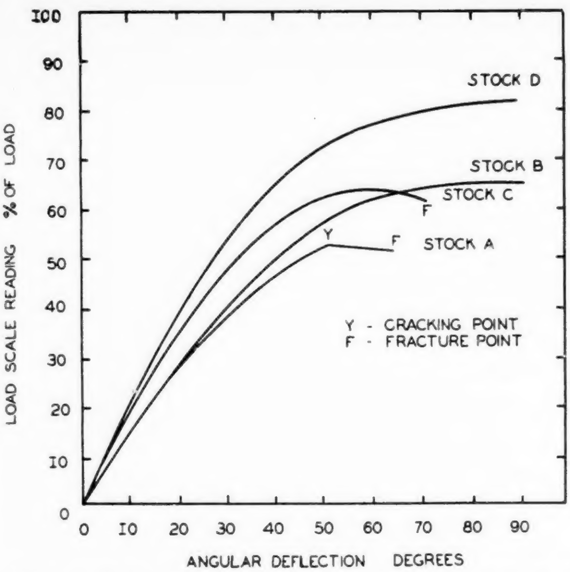

Fig. 1. Load *vs.* Deflection—Cured *vs.* Uncured Pliolite S6-GR-S Stocks (1- by 4- by 0.075-Inch Strip; 6 In.-Lb. Weight)

pact resistance becomes, but at the same time there is a decrease in stiffness and rigidity of the stocks. This point is clearly demonstrated by the data presented in Table 3.

TABLE 3. VARIATIONS IN HIGH STYRENE RESIN-RUBBER RATIOS

Pliolite S6	90	85	80	75
Natural rubber	10	15	20	25
ZnO	5	5	5	5
Sym dibeta naphthyl para-phenylene diamine*	2	2	2	2
Stearic acid	2	2	2	2
Benzothiazyl disulfide	1	1	1	1
Sulfur	2	2	2	2

*Age Rite White.

Cure 40'/290° F.				
Tensile strength, #/in²	5715	5500	4070	3575
Ultimate elongation, %	0	0	0	20
Durometer hardness (Shore D)	77	76	75	73
Unnotched impact resistance, in-lbs.	16	31	48	78
Stiffness in flexure*, in-lbs.	6.64	5.12	4.42	3.36

* See Table 2.

It will be noted from the data that some decrease occurs in the tensile strength of the resin as it is plasticized with the rubber, but at the same time it will also be noted that it is necessary to go to a 75/25 resin rubber ratio before any appreciable elongation is encountered. The relative stiffness of these stocks, as measured by the Olsen stiffness tester, is more clearly shown on the plot of Load Scale Reading *vs.* Angular Deflection shown in Figure 2.

While this plot indicates a marked drop in stiffness from the uplasticized resin to the 70/30 resin-rubber blend, it must be viewed in the light that the 70/30 blend is a rather stiff stock and that the higher resin ratios represent greater degrees of stiffness. Not until the 60/40 resin-rubber ratio is reached do the stocks begin to lose their rigid characteristics.

Various Rubbers in Resin-Rubber Blends

Data thus far presented have dealt with blends of high styrene resin with natural rubber and GR-S; however, it is possible to produce impact resistant stocks with such rubbers as natural rubber, GR-S, nitrile rubber, and neoprene. Blends of Butyl rubber with the high styrene resin give relatively poor impact resistance, presumably because of poor compatibility between the Butyl rubber and the resin. The physical data with various polymers are shown in Table 4.

TABLE 4. VARIOUS POLYMERS IN IMPACT RESISTANT STOCK

Pliolite S6	80	80	80	70	70
Natural rubber	20	..	..	..	..
GR-S	..	20	..	..	..
Chemigum N4	..	..	20	..	..
Neoprene (GR-M)	..	..	..	30	..
Butyl rubber (GR-I)	..	..	..	..	30
ZnO	5	5	5	5	5
Sym dibeta naphthyl para-phenylene diamine	2	2	2	2	2
Stearic acid	2	2	2	2	2
Benzothiazyl disulfide	1	1	1	..	0.5
Sulfur	2	2	2	..	2
Tetramethyl thiuram disulfide	..	0.12	..	..	1
MgO	..	..	..	7	..
Cure 40'/290° F.					
Tensile strength, lbs./in²	4070	4870	4880	4450	3960
Ultimate elongation, %	0	0	10	5	0
Durometer hardness (Shore D)	75	76	76	73	71
Unnotched impact resistance, in-lbs.	48	52	52	44	20
Stiffness in flexure*	4.16	4.00	4.40	3.68	4.00
Taber abrasion†, cc loss/500 rev. 1000 gm. wt., H22 wheels	.452	.237	.081	.252	.197

*See Table 2.
†Taber Instrument Corp., North Tonawanda, N. Y.

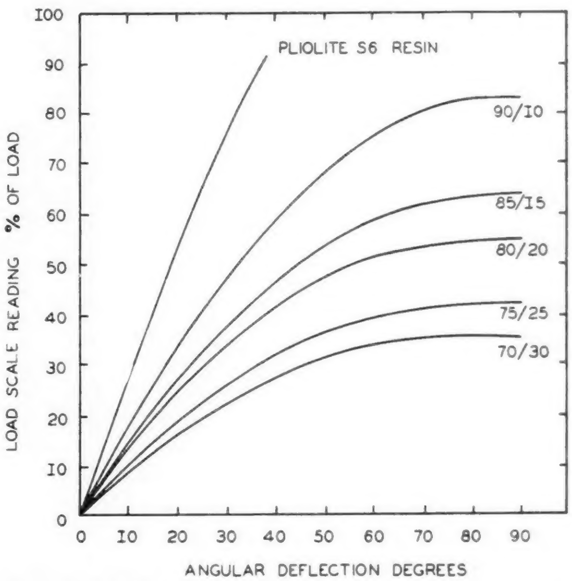

Fig. 2. Deflection *vs.* Load—Pliolite S6-Natural Rubber Blends (1- by 4- by 0.075-Inch Strip; 8 In.-Lb. Weight)

The data in Table 4 indicate that of the rubbers tested, the GR-S and nitrile rubber polymers produce stocks of greater impact resistance, higher tensile strength and the greatest durometer hardness of any of the rubbers. The greater compatibility of these polymers with the styrene-butadiene copolymer resin is an explanation for this behavior. Because of the superior physical data obtained with the nitrile rubber and GR-S stocks, a complete range of physical data for these blends is presented in Tables 5 and 6. No further discussion of these data will be made since the conclusions to be drawn are essentially the same as those made for the data presented in Table 3.

TABLE 5. HIGH STYRENE RESIN BLENDS WITH GR-S

Pliolite S6	90	85	80	75
GR-S	10	15	20	25
ZnO	5	5	5	5
Sym dibeta naphthyl paraphenylene diamine	2	2	2	2
Stearic acid	2	2	2	2
Benzothiazyl disulfide	1	1	1	1
Sulfur	2	2	2	2
Tetramethyl thiuram disulfide	0.12	0.12	0.12	0.12
Cure 40'/290° F.				
Tensile strength, #/in²	6360	5680	4870	4140
Ultimate elongation, %	0	0	0	35
Durometer hardness (Shore D)	80	77	76	72
Unnotched impact resistance, in-lbs.	16	20	52	100+
Stiffness in flexure*, in-lbs.	5.68	5.52	4.00	3.36
Taber abrasion, cc/500 rev. 1000 gm wt H22 wheels	.299	.249	.237	.213

*See Table 2.

TABLE 6. HIGH STYRENE RESIN BLENDS WITH NITRILE RUBBER

Pliolite S6	90	85	80	75
Chemigum N4	10	15	20	25
ZnO	5	5	5	5
Sym dibeta naphthyl paraphenylene diamine	2	2	2	2
Stearic acid	2	2	2	2
Benzothiazyl disulfide	1	1	1	1
Sulfur	2	2	2	2
Cure 40'/290° F.				
Tensile strength, #/in²	5560	6015	4880	4250
Ultimate elongation, %	0	0	10	30
Durometer hardness (Shore D)	77	77	76	74
Unnotched impact resistance, in-lbs.	7	18	52	100+
Stiffness in flexure*, in-lbs.	5.76	4.40	4.40	3.20
Taber abrasion, cc/500 rev. 1000 gm wt. H22 wheels	.180	.097	.081	.084

*See Table 2.

Compounding Possibilities

The resin-rubber blends, being blends of a thermoplastic resin and a rubber-like material, present the formulator the opportunity to modify the impact stock through pigmentation and loading by conventional rubber mill mixing techniques. The styrene copolymer resins are light-colored, non-staining resins and, when used in combination with non-discoloring rubbers, present the possibility of pigmenting the batches into a wide range of colored stocks, or loading the stocks with reinforcing or loading pigments to fit any desired need. Tables 7-9 present typical data which might be obtained with loadings up to 30 volumes of a representative reinforcing pigment such as SRF black and Silene EF, and a representative loading pigment such as natural whiting.

TABLE 7. EFFECT OF SRF BLACK LOADING IN A 75/25 RESIN GR-S IMPACT STOCK

Pliolite S6	75	75	75	75	75
GR-S	25	25	25	25	25
SRF black	0	18.5	27.8	37	55.5
ZnO	5	5	5	5	5
Stearic acid	2	2	2	2	2
Benzothiazyl disulfide	1	1	1	1	1
Tetramethyl thiuram disulfide	0.12	0.12	0.12	0.12	0.12
Sulfur	2	2	2	2	2
Volumes SRF loading	0	10	15	20	30
Cure 40'/290° F.					
Tensile strength, #/in²	3600	3580	3870	4465	4690
Ultimate elongation, %	70	20	20	15	20
Durometer hardness (Shore D)	69	73	73	73	73
Unnotched impact resistance, in-lbs.	100+	100+	90+	100+	90+
Compressive strength, #/in²	4500	4850	4900	4900	5150
Taber abrasion cc loss/500 rev.	.195	.311	.276	.185	.172
Heat distortion point °F.	131°	130°	129°	129°	137°

TABLE 8. EFFECT OF SILENE EF LOADING IN A 75/25 RESIN GR-S IMPACT STOCK

Pliolite S6	75	75	75	75	75
GR-S	25	25	25	25	25
Silene EF	0	20.5	30.8	41	61.5
ZnO	5	5	5	5	5
Stearic acid	2	2	2	2	2
Benzothiazyl disulfide	1	1	1	1	1
Tetramethyl thiuram disulfide	0.12	0.12	0.12	0.12	0.12
Sulfur	2	2	2	2	2
Cure 40'/290° F.					
Tensile strength, #/in²	3600	3000	2850	2815	2410
Ultimate elongation, %	70	20	20	20	10
Durometer hardness (Shore D)	67	73	75	75	76
Unnotched impact resistance, in-lbs.	100+	85	72	59	18
Compression strength, #/in²	4500	4600	4650	4950	5500
Taber abrasion, cc loss/500 rev.	.195	...	.217	.196	.150
Heat distortion point, °F.	131°	122°	126°	122°	126°

TABLE 9. EFFECT OF WHITING LOADING IN A 75/25 RESIN GR-S IMPACT STOCK

Pliolite S6	75	75	75	75	75
GR-S	25	25	25	25	25
Natural whiting	0	26.5	39.8	53	79.5
ZnO	5	5	5	5	5
Stearic acid	2	2	2	2	2
Benzothiazyl disulfide	1	1	1	1	1
Tetramethyl thiuram disulfide	0.12	0.12	0.12	0.12	0.12
Sulfur	2	2	2	2	2
Volumes whiting loading	0	10	15	20	30
Cure 40'/290° F.					
Tensile strength, #/in²	3600	3410	3315	3010	2820
Ultimate elongation, %	70	20	20	20	20
Durometer hardness (Shore D)	69	73	74	75	73
Unnotched impact resistance, in-lbs.	100+	100+	100+	100+	100+
Compressive strength, #/in²	4500	4450	4800	5000	5200
Taber abrasion, cc/500 rev.	.195	.315	.480	.387	.672
Heat distortion point, °F.	131°	130°	126°	132°	131°

The data tabulated in Tables 7-9 indicate that the resin-rubber blend impact stock can be modified by pigment loading without changing the characteristic properties of the stock. Tensile strengths in general are lowered by pigment loading, but the elongation of the stock is relatively unchanged. The notable exception to this statement is SRF black which actually shows reinforcing action in the stock. The hardness of the stocks is increased only slightly by the loading.

Impact resistance remains good in the loaded stock with the exception of the stocks with Silene EF loading, where some decrease in impact resistance can be noted. These stocks, however, remain good with up to 20 volumes loading of Silene EF. The difficulty of dispersing this pigment, particularly in a resin stock using free pigment, may account for the decrease noted. Without exception, the compressive strength of the stocks is increased by the loading pigments. Abrasion resistance results are good except for high loadings of filler pigments. As would be expected, the heat distortion, being a function of the resin, is unaffected by the loading.

The data presented clearly show the almost unlimited possibilities in compounding impact resistant stocks in a wide range of price, a great variation in weight per unit volume, a wide range of physical properties, and in an unlimited number of colors to meet desired specifications or applications.

Applicability of Impact Resistant Resin-Rubber Blends

These impact resistant blends, consisting largely of a hard resin, can be formed into articles having a smooth gloss finish when molded in smoothly finished molds. If molds having excellent finish are not available, the articles can be buffed and polished on conventional polishing equipment to give an excellent gloss finish.

The thermoplastic nature of the resin causes it to flow very easily in compression molding, giving very good mold duplication. For articles of irregular shapes which cannot be molded to shape, it is possible to cut the stock to shape by sawing, turn the stock to shape on a lathe, or drill the stock with conventional wood or metal working equipment. This unique property of machinability expands the field of application for this type of stock.

Milling Procedures

Impact resistant resin-rubber blends can be milled on ordinary rubber or plastic milling equipment. The recommended milling procedure is as follows:

(1) Band the high styrene resin on a hot mill. Temperatures of 150-170° F. are usually required.

(2) Work the resin and adjust the mill gage until a small rolling bank is attained.

(3) Add the plasticizing rubber polymer to the banded resin slowly, allowing the rubber to disperse into the resin. Too rapid addition of rubber can result in poor dispersion or cause the batch to become crumbly on the mill.

(4) When the rubber is dispersed in the resin, the temperature of the mill can be reduced, and the reinforcing pigments, filler pigments, color pigments, and curing agents dispersed following the usual rubber mill mixing procedures.

The batches can also be Banbury mixed by breaking down the resin in a hot Banbury, adding the rubber followed by the pigments, and mixing until dispersed.

Since the batch becomes hard and stiff upon cooling, the pieces are usually prepared for molding immediately upon removal from the mill. If this procedure is im-

(*Continued on page 116*)

Basic Reactions Occurring During Rubber Reclaiming—II[1]

The Influence of Solvent Naphtha, Storage of the Reclaim, Aging of the Scrap Prior to Reclaiming, and Infrared Spectra of Natural Rubber Reclaim

D. S. le Beau[2]

PREVIOUS investigations[3] of the reactions occurring during various periods of time of rubber reclaiming and in the presence of solutions of defibering agents or open steam have shown the predominating influence of the reclaiming atmosphere, its acidity and alkalinity, on the course of these reactions. No change could be observed in the unsaturation of the water digested or metallic chloride-digested reclaims. Some, but only a very small amount of unsaturation appeared lost at and beyond nine hours of heating at 196° C. in an alkaline medium or in open steam. It was felt, however, that the value obtained for the unsaturation of the various reclaims, even though composed of two or more check analyses in each case, possibly might not reflect the permanent introduction of small amounts of oxygen into the rubber molecule. The presence of even small amounts of C=O and COH groups would, however, be detectable by the application of infrared analysis.

Infrared Spectrography

For examination by the methods of infrared spectroscopy, four reclaims were prepared by heating the pure gum compound previously studied[3] in finely comminuted condition and in the absence of any reclaiming oils for nine hours at 196° C. in the digester[3] in the presence of either alkali, water, or metallic chloride solutions and also in open steam (heater). These reclaims were washed to pH of 7, dried in vacuum, and then subjected to a sheeting out on a rubber mill and fastened on to a framelike sample holder of one- by two-inch size. Experiments showed that a sheet thickness of 0.003-0.005-inch was adequate in its infrared transparency. Other investigators[4] had also reported this range of thickness as appropriate in transparency when studying pure gum compounds.

This method of sample preparation was preferred to the formation of a sample film by evaporation of a rubber solution because in the case of reclaim and particularly of reclaims prepared in the presence of metallic chlorides such film formation would have involved the use of mechanical force to achieve adequate dispersion of the reclaim in the solvent. Care was taken to permit a time interval of between 4-6 weeks to occur between the sheeting out of the reclaim samples and their investigation by infrared analysis. Hydroperoxides which undoubtedly formed during the mill sheeting[5] would have deteriorated within that period and thus would not appear in the infrared absorption spectrum. The smoked sheet from which the natural rubber gum compound had been originally prepared as well as the various compounding ingredients, the unvulcanized and the vulcanized compound were also subjected to infrared analysis. Acetone extraction of the samples, however, was avoided because of the great susceptibility of the alkali treated rubber to oxidation after completion of the extract.

While the unvulcanized and also the vulcanized natural rubber gum compound showed, as usual,[6, 7] some absorption at 2.7μ (OH group) and at 5.8μ (C=O group), hardly any trace of it could be found in the spectra of the water-digester and metallic chloride-digester reclaims prepared therefrom. The heater reclaim, however, and more so the alkali-digester reclaim showed some absorption in these regions, though not so much as either the unvulcanized or the vulcanized original compound. (The storage stability of alkali reclaims—as discussed and shown later on—is found to be smaller than that of metallic chloride or water-digester treated reclaims). The presence of aldehyde groups in the reclaims could not be determined because of the closeness of the aldehyde absorption band to that of the C=O absorption band. The absorption band at 6.5μ previously found in gum compounds[4, 7] and attributed to impurities[7] was also found in the spectra of the present samples. Fatty acids show strong absorption at 6.5μ. The pure gum compound used for this investigation contained stearic acid, and the samples had not been acetone extracted for reasons mentioned above.

It is interesting to note that in the spectrum of the alkali reclaim, this band appeared to shift to 6.36μ. This would seem to make the explanation advanced for it by other investigators[7] plausible, particularly so if it is kept in mind that these samples had not been acetone extracted.

The possibility of ether linkages (C—O—C) occurring either intermolecularly or intramolecularly cannot be determined at present because the various vibrational possibilities of such a group have not yet been clearly established. If such linkage should occur, however, it cannot occur to any greater extent at the double bond because no loss in the unsaturation was found for metallic chloride or water-digested reclaims, and only a small loss in unsaturation was found to occur in alkali or open steam reclaims. Should such ether linkage occur to any greater extent at the α carbon atom, we could expect that revulcanization of the reclaim and the quantitative oxidation

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[1]Presented before the Division of Rubber Chemistry, A. C. S., Chicago, Ill., Apr. 22, 1948.

[2]Midwest Rubber Reclaiming Co., East St. Louis, Ill.

[3]"Basic Reactions Occurring during Rubber Reclaiming—I." D. S. le Beau, India RUBBER WORLD, 118, 1, 59 (1948).

[4]N. Sheppard, G. B. M. Sutherland, *Trans. Faraday Soc.*, 41, 261 (1945).

[5]W. F. Busse, *Ind. Eng. Chem.*, 24, 140, (1931).
F. H. Cotton, *Trans. Inst. Rubber Ind.*, 21, 153 (1945).

[6]R. B. Barnes, W. Liddell, V. Z. Williams, *Ind. Eng. Chem. (Anal. Ed.)*, 15, 83 (1943).

[7]H. L. Dinsmore, D. C. Smith, *Anal. Chem.*, 20, 11 (1948).

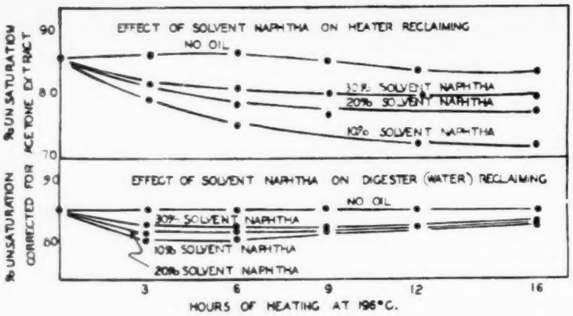

Fig. 1

of the reclaim by chromic acid[8] should be affected by it. Even though the accuracy of this latter oxidation method cannot be compared with that of infrared analysis, the data available[9] at this time show that unless reclaiming is carried out under exaggerated oxygenating conditions, its quantitative oxidation by chromic acid is very close to that obtained from vulcanized rubber. The possibility, however, of an ether linkage as yet cannot be ruled out completely.

From the chemical data previously obtained[3] as well as from the spectroscopic data it can be observed that permanent oxidation of the rubber molecules plays a very small part in the reclaiming reactions, if indeed it occurs at all. Keeping in mind, however, the important role which oxygen has been found to play in the reclaiming processes,[10, 11] it can be concluded that oxygen exerts a temporary influence only, taking part in reactions which do not lead to its permanent introduction into the rubber molecules provided, of course, that the reclaiming process is not conducted under exaggerated oxygenating conditions. (A reclaiming time interval of nine hours at 196° C. in the digester can be considered as one of fairly general occurrence throughout the reclaiming industry. Heater reclaiming during such an interval and temperature, however, is longer than usually practiced.)

The Effect of Solvent Naphtha

Experiments carried out about two decades ago[12] have shown that the tensile strength of a vulcanized tread compound deteriorates very rapidly as the temperature and the time of heating in open steam were increased. These experiments were repeated to see whether the progress in the art of compounding with respect to vulcanization would have caused any essential change in the breakdown of the physical properties of the rubber compound. Results which were very similar to the original experiments were obtained. However, if the tread compound was first immersed into solvent naphtha until approximately 15% of it by weight had been taken up and then subjected to the same heat treatment, a lesser degree of deterioration of the physical properties was obtained up to heating periods of nine hours at 196° C. Therefore it seemed of interest to determine the effect of the solvent naphtha on the molecular breakdown of the rubber hydrocarbon during the reclaiming process. It is well known today that the amount of solvent naphtha used for reclaiming will depend on the time and the temperature of the reclaiming process as well as on the state of cure of the scrap and the compounding ingredients contained therein.

[8] V. L. Burger, *Rubber Chem. Tech.*, 16, 660 (1943).
[9] D. S. le Beau, *Anal. Chem.*, 20, 355 (1948).
[10] W. G. Kirby, L. E. Steinle, U. S. Patent No. 2,279,047 (1942).
[11] H. F. Palmer, F. J. Kilbourne, Jr., *Ind. Eng. Chem.*, 32, 512 (1940).
[12] H. A. Winkelmann, *Ibid.*, 18, 1163 (1926).

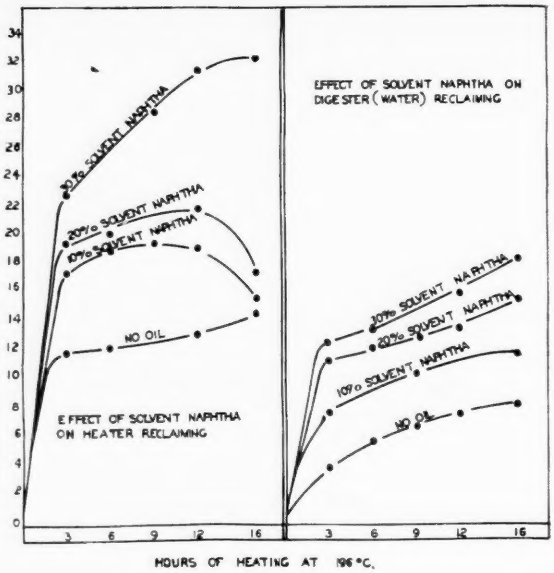

Fig. 2

For the purpose of evaluating the effect of solvent naphtha on the reclaiming reaction from 10-30% of it was added to a natural rubber gum compound whose reclaiming reactions without the addition of oils had previously been studied.[3] The solvent used was coal tar naphtha. This range was considered large enough to cover the range of between 5-15% of solvent naphtha usually added to filler loaded scrap during practical reclaiming operations. The solvent naphtha was slowly added to the scrap while it was being stirred and prior to the addition of any defibering agents. Reclaiming was achieved in the digester in the presence of water, metallic chloride, or alkali and also in open steam (heater). The washing, drying, and subsequent analyses of the reclaims obtained in this way was carried out as previously described.[3] It is to be understood, however, that the percentages of solvent naphtha as recorded are approximate amounts only, since some evaporation of it is bound to take place even during the short time intervals occurring between mixing and actual reclaiming.

Figure 1 shows the effect of the solvent naphtha on the unsaturation of the reclaims prepared in open steam or in the digester (water). A decrease in the unsaturation of the rubber can be noticed in both cases; however the reclaim prepared in the digester (water) shows less decrease in unsaturation than that prepared in the heater. Reclaims prepared in the presence of 10% solvent naphtha exhibit less unsaturation than those prepared in the presence of 20% solvent naphtha, and the latter yielded less unsaturation than reclaims prepared in the presence of 30% solvent naphtha. Thus the unsaturation of the reclaim increases again as the amount of solvent naphtha is increased, but it does not reach the value originally obtained for reclaims prepared without solvent naphtha. The acetone extracts of these reclaims hardly change at all after an initial increase has taken place. The curves obtained for the chloroform extracts (Figure 2) show that progressively increasing amounts of solvent naphtha cause a progressive increase in the chloroform extract of the digester reclaims. The rate of chloroform extraction was found to be highest for short reclaiming intervals. The rate of molecular breakdown, however, increases even for longer periods of reclaiming as the amount of solvent naphtha is increased. While

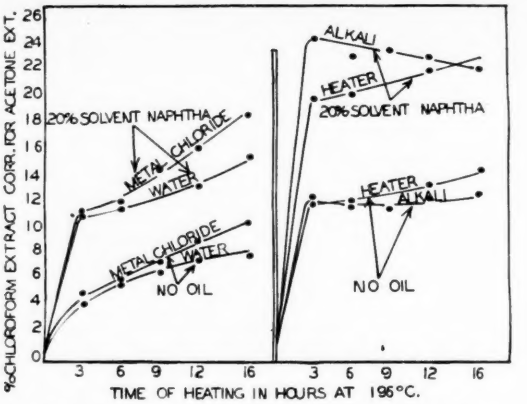

Fig. 3. Influence of Solvent Naphtha and Defibering Agents

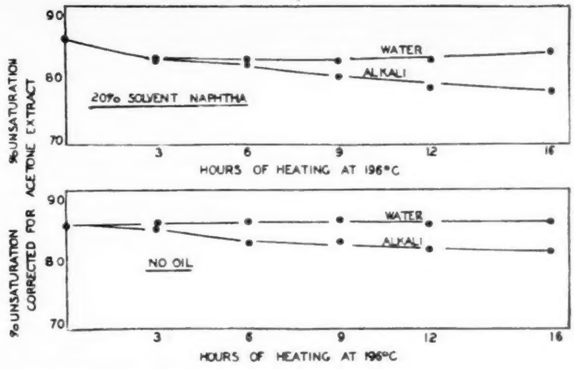

Fig. 4. Unsaturation Values for Water- and Alkali-Digester Reclaims with and without Solvent Naphtha

this increase in total chloroform extractable matter due to the presence of solvent naphtha is considerable for digester-water reclaims, it cannot compete with the great increase in molecular breakdown obtained under identical conditions, but for reclaims prepared in the heater.

It was of interest to study the changes which the presence of solvent naphtha might bring about in the reclaiming reactions occurring in acid or alkaline defibering media. (Figure 3.) Although in each case the presence of solvent naphtha caused a considerable increase in the molecular breakdown, the overall trend and grouping of the curves, as previously observed for reclaims prepared in the absence of solvent naphtha, have not changed. If the curves obtained for the unsaturation values of the water-digester and alkali-digester reclaims obtained in the presence and absence of solvent naphtha (Figure 4) are compared, the identical trend becomes still more evident. It can again be concluded, therefore, that the course of the reclaiming reaction is conditioned by the surrounding medium, its acidity or alkalinity, and is accelerated and amplified only by the presence of solvent naphtha.

The decrease in unsaturation and particularly the greater decrease in unsaturation obtained from reclaims prepared in the presence of smaller amounts of solvent naphtha appear puzzling and can be explained on a tentative basis only. Keeping in mind the part which oxygen undoubtedly plays in the reclaiming of natural rubber, we can expect that the access to oxygen would be greater in a rubber polymer where the molecular chains have been pried apart to a certain extent. The absorption of 10% of solvent naphtha will, however, not permit a great amount of prying apart of the molecules, nor will all of the space between the molecules have been taken up uniformly by solvent naphtha molecules. This nonuniformity will cause some strain and deformation on part of the rubber molecules. If oxygen accessibility plays any part in the reclaiming reaction, we would expect a greater decrease in unsaturation to occur in the reclaim prepared in open steam (heater) in the presence of smaller amounts of solvent naphtha than in a digester-water reclaim similarly composed. The experimental results seem to bear this point out. It is impossible for the moment to determine what kind of change has taken place in the rubber molecule to cause the decrease in unsaturation. Intramolecular bridging appears less plausible than intermolecular bridging. Infrared analysis might give a clue to the kind of reaction which occurred; however the possibility cannot be dismissed that despite careful acetone extraction some component of the solvent naphtha might remain in the reclaim, even if only in very small proportions, and would thus disturb the interpretation of an infrared spectrogram. It seems fairly improbable, though, to expect this decrease in unsaturation to be caused by a primary chemical bond between the rubber and solvent naphtha molecules. If this would occur, we could certainly expect that the reclaims prepared in the presence of 20 and 30% solvent naphtha should show a still more pronounced decrease in unsaturation than that obtained by the use of 10% solvent naphtha. Actually the opposite condition exists, as brought out by the experimental data. As the amount of solvent naphtha is increased, the rubber chains are pried farther and farther apart, and the distribution of the solvent naphtha molecules between the rubber chains can be considered to become more uniform. Therefore reactions between the rubber molecules are less likely to occur because combination by chemical forces becomes more difficult as the distances between two rubber molecules increases. Furthermore, the solvent naphtha molecules present in greater proportions can be expected to have a blocking effect.

Effect of Reclaim Storage

The practical effects of storage on reclaim are well known. In general a decrease in the chloroform extract has been noticed. The phenomenon has been studied in greater detail over a period of weeks for two whole tire reclaims.[11] Tire reclaims, however, contain carbon black, and the insolubilization of the low molecular rubber hydrocarbon component due to the presence of carbon black is a well-known phenomenon encountered both in synthetic as well as in natural rubber carbon black compounding. Therefore the decrease of the chloroform extract experienced for the whole tire reclaims could be due at least to three factors: the addition of reclaiming oils, the presence of carbon black, and the instability of the reclaim rubber hydrocarbon itself. The latter factor can either cause a decrease or an increase in the chloroform extract of the reclaim. If reclaiming reactions proceed on the basis of hydroperoxidic chain reactions, instability of the rubber hydrocarbon during storage can be expected. Also, such instability should tend to increase the amount of chloroform extract during storage. On the basis of this condition it can be expected that the shorter the reclaiming interval has been, the more unstable a reclaim should have been produced.[3] Furthermore, it can also be expected that under hydroperoxidic reaction conditions the alkali reclaim should prove the least stable[13] and that digester-water and di-

[13] H. Farmer, *India Rubber J.*, 112, 119 (1947).

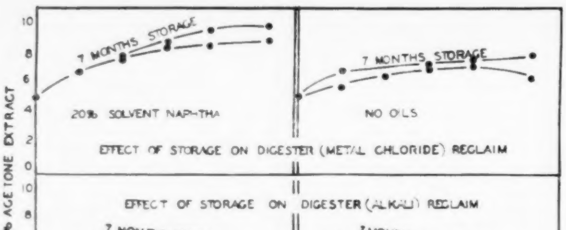

Fig. 5

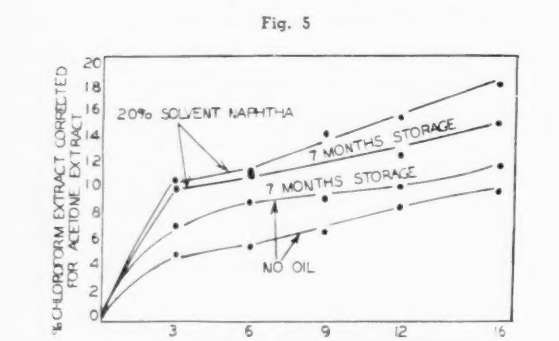

Fig. 6. Effect of Storage on Digester (Metal Chloride) Reclaim

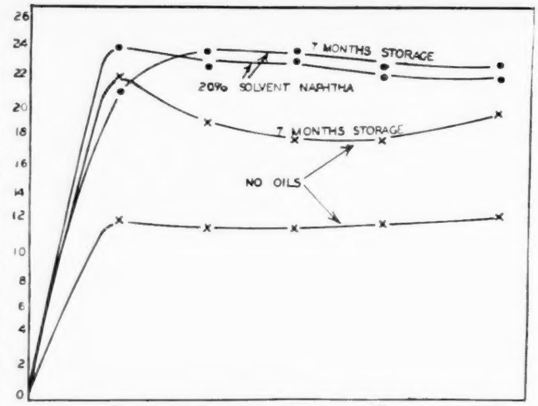

Fig. 7. Effect of Storage on Digester (Alkali) Reclaim

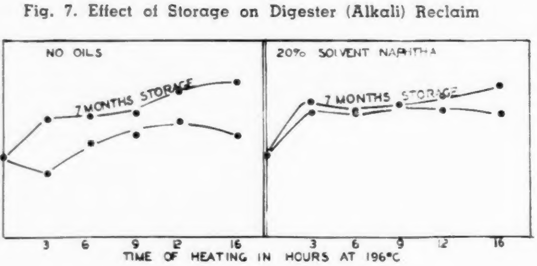

Fig. 8. Effect of Storage on Digester (Water) Reclaim

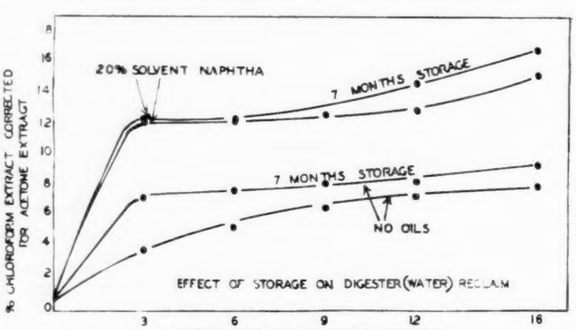

Fig. 9

gester-metallic chloride reclaims should be similar in their behavior, but more stable than the former.

An increase in the chloroform extract during storage of reclaim, however, would not preclude the simultaneous occurrence of the recovery of the reclaim or the chloroform extractable matter in it. While the amount of the chloroform extract might increase, the molecular weight of the chloroform extractable rubber could also increase during storage. Chloroform is known to be an excellent solvent for the rubber hydrocarbon and for this reason is not used in the fractionation of its molecular weights. It is entirely possible that the chloroform extractable fraction of the reclaim has increased in molecular weight, but yet remains soluble in chloroform. Viscosity determinations of the chloroform extract would probably answer this question.

For the purpose of studying the effect of storage on the reclaim hydrocarbon, the digester (alkali, water, or metallic chloride) reclaims and the open steam (heater) reclaims prepared for a previous study[3] were stored at 80° F. and 50% moisture over a period of seven months. Reclaims prepared in the presence of 20% solvent naphtha and described above were equally stored. Figure 5 shows the acetone extracts obtained from the metallic chloride and alkali treated reclaims. The metallic chloride-digester reclaim exhibits a slight increase in the acetone extract during storage. The presence or absence of 20% solvent naphtha during reclaiming did not seem to affect this condition to any great extent. The alkali-digester reclaim shows a considerable increase in acetone extractable matter during the storage period, the greatest increase of it occurs in reclaims which had been subjected to short reclaiming intervals. The presence of solvent naphtha appears to exert a stabilizing influence on the formation of acetone extractable matter. The increase in acetone extract, though still pronounced and still greater for short reclaiming intervals, is not so great as that encountered in the reclaims prepared in the absence of solvent naphtha.

Figure 6 shows the change in the chloroform extract occurring in metallic chloride-digester reclaim during an identical storage period. An increase in the chloroform extract has occurred, and again the presence of solvent naphtha during reclaiming appears to stabilize the reclaim. Figure 7 records the results obtained from the storage of alkali-digester reclaim. The increase in the chloroform extract of the reclaims prepared without solvent naphtha is considerable; the greatest amount of it occurs in those alkali reclaims subjected to short reclaiming periods. The presence of solvent naphtha during reclaiming, however, exerts a pronounced stabilizing effect on the molecular breakdown during storage. The chloroform extracts of the fresh and the stored reclaim remain almost constant. Figure 8 represents the data obtained for the acetone extracts of water-digester reclaim. While the water-digester reclaim prepared in the absence of oils exhibits a noticeable increase in the acetone extract during storage, this effect seems blocked,

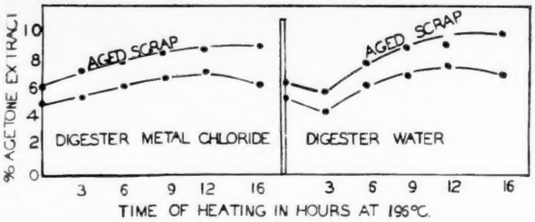

Fig. 10. Effect of Aging of Scrap

and the reclaim appears stabilized if reclamation was carried out in the presence of solvent naphtha. Figure 9 represents the data obtained for the chloroform extract of the two corresponding water-digester reclaims. Here too the increase in chloroform extract during storage of the reclaim prepared in the absence of solvent naphtha is noticeable. The greatest increase in chloroform extract again occurs in reclaims subjected to short reclaiming periods. The same kind of reclaim prepared in the presence of solvent naphtha shows a much greater stability.

Reclaims prepared in open steam (heater) with or without the addition of solvent naphtha show little change in their chloroform extracts during storage. A considerable formation of acetone extractable matter, however, can be noticed during storage regardless of whether the reclaim was prepared in the presence or absence of solvent naphtha.

A decrease in the unsaturation of all the reclaims occurs during their storage. This decrease is small; yet it is consistent and equally noticeable for reclaims prepared in the presence of solvent naphtha. Table 1 records the values obtained for reclaims three weeks and seven months of age.

TABLE 1. % UNSATURATION CORRECTED FOR ACETONE EXTRACT

Time of Heating	Digester Alkali		Digester Water		Digester Metallic Chloride		Open Steam Heater	
at 196° C.	3 Wks.	7 Mos.	3 Wks.	7 Mos.	3 Wks.	7 Mos.	3 Wks.	7 Mos.
3 Hrs.	86.3	83.5	86.5	80.0	86.5	....	86.5	....
6 Hrs.	84.5	82.5	86.5	81.5	....	80.5	86.5	85.0
9 Hrs.	84.0	82.0	86.8	82.0	87.0	81.0	86.0	84.5
12 Hrs	83.3	77.0	86.0	82.5	86.5	....	84.5	78.5
16 Hrs.	83.0	76.5	87.0	83.0	86.0	83.5	83.0	76.0

Storage of the chloroform extractable rubber hydrocarbon over a period of seven months hardly changed its unsaturation.

From the data presented on the stability of reclaim during storage it can be concluded that the addition of solvent naphtha exerts a stabilizing influence on digester (alkali, water, or metallic chloride) reclaims. The decrease usually noticed in the chloroform extract of production reclaims can be due to the rearrangment of the carbon black dispersion during the storage interval and also to the influence of the reclaiming oils used. The changes which take place during the storage of reclaim are influenced by the acidity and the alkalinity of the medium in which the reclaiming was originally conducted. Short reclaiming intervals, as expected, result in reclaims of greater storage instability.

The Effect of Aging of the Scrap Prior to Reclamation

It has long been known to the reclaimer that scrap which had been more oxidized during the life time of its use could be reclaimed with greater ease. None of the present aging tests, however, can fully simulate the aging of rubber under service conditions. To study the effect of aging of the scrap on reclaiming a medium of artificial aging was desired which would not permit too uneven an

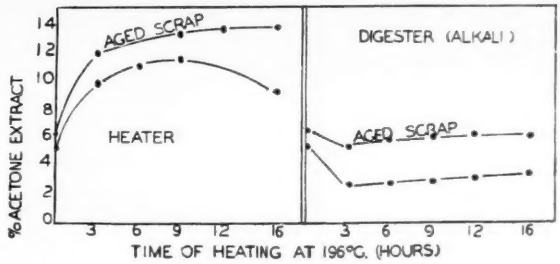

Fig. 11. Effect of Aging of Scrap

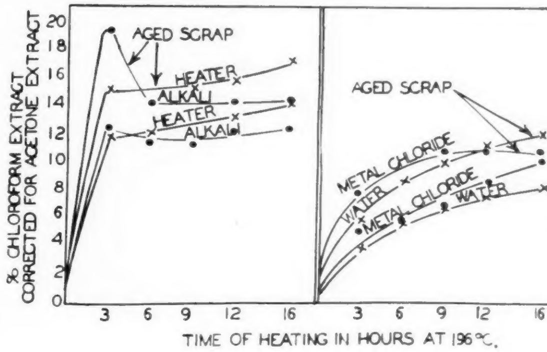

Fig. 12. Effect of Aging of Scrap

attack on the rubber by oxygen. It was decided, therefore, to make use of the Geer oven at 70° C. and for a period of 160 hours. The natural rubber compound previously described[3] increased in acetone extract during this aging period from 5.4 to 6.3%. The chloroform extract increased from 0.6 to 2%, but the unsaturation remained steady. The scrap was permitted to recover for at least 24 hours after the aging before it was subjected to grinding and reclaiming.

Figures 10 and 11 record the effect of the aging of the scrap on the formation of acetone extract during the various reclaiming processes. The two curves obtained for the fresh and the aged scrap run almost parallel in the case of the water-digester and metallic chloride-digester reclaims; the formation of acetone extractable matter during reclaiming is slightly influenced only by the oxidation taking place prior to the reclaiming. If, however, aged scrap is reclaimed in the digester in the presence of alkali, the formation of a considerable amount of acetone extractable matter can be noticed during the reclaiming process. Figure 12 shows the effect of the aging of scrap prior to reclaiming on the chloroform extract of the reclaim. The chloroform extract of the digester (water or metallic chloride) reclaims is increased by the aging of the scrap. The greatest increase in chloroform extract, however, can be found for alkali digester reclaim and in particular for the short reclaiming intervals of this reclaim. This point would seem to indicate that a small amount of secondary oxidative attack of the rubber hydrocarbon facilitates the molecular breakdown. The possibility of such reaction has already been mentioned.[13] Aging of scrap prior to reclamation, however, does not affect the relative position of the curves toward each other; i.e., the surrounding atmosphere during the reclaiming process is still the dominating influence in regard to the reclaiming reactions which occur.

The unsaturation of the reclaims prepared from the aged scrap is hardly different from that of the fresh

scrap. It can be expected, however, that if aging is carried to a greater extent, changes in the unsaturation of the reclaims would occur.

Summary and Conclusions

Infrared analysis of digester (alkali, water, or metallic chloride) reclaims and of heater reclaim shows that a permanent combination of oxygen with the rubber hydrocarbon molecules and in the form of C=O or OH groups does not occur during the reclaiming of natural rubber. It is not possible to ascertain the formation of C—O—C bonds. Chemical considerations indicate that if such bonds are formed, they are not present to any greater extent.

The presence of solvent naphtha during the reclaiming process causes a decrease in the unsaturation of both digester and heater reclaims. This decrease is greater if smaller amounts of solvent naphtha are present. A tentative explanation has been offered based on the swelling of the rubber and taking into account the strong dependency of the chemical bond formation on the distances between the molecules.

The molecular breakdown of the rubber is highly accelerated and amplified by the presence of solvent naphtha, but the course of the reclaiming reactions are not changed and are still dependent on the surrounding reclaiming medium and its acidity or alkalinity.

The stability of the reclaims during storage is also influenced by the surrounding medium during the original reclaiming procedure. Short reclaiming intervals in general and alkaline reclaiming media provide the least stable reclaims. Such behavior can be expected if hydroperoxidic chain reactions take place during the reclaiming processes.

The presence of solvent naphtha during the reclaiming process brings about greater storage stability of the reclaim.

Aging of the scrap prior to reclaiming promotes greater molecular breakdown particularly during short reclaiming intervals and in the presence of alkali.

The author wishes to express appreciation to N. Novakovich for carrying out the preparation of the samples and their analyses. The infrared spectrograms resulted from a research project of the Midwest Rubber Reclaiming Co. at the Ohio State Research Foundation University of Ohio, Columbus, O., under the supervision of Drs. Nielsen and Oetjen.

Carbon pH

(Continued from page 62)

given the rubber compounder two new ingredients, high pH and structure, with which to build better products.

(3) High pH fine furnace carbon has demonstrated in tire service outstanding age and flex cut resistance.

(4) High pH carbons have added problems of scorch and cure to those already facing the tire compounder.

(5) New vulcanization approaches seem to be indicated as preferable over modifying the carbon lest the advantages of purity be lost in attempting to slow rate of cure.

(6) An approach to the solution of the problem of scorch and fast cure has been shown.

(7) The limit of optimum structure development has as yet not been determined. There does seem to be evidence, however, that too much structure, while solving some problems, may add to others. A proper balance of this new "ingredient" for building carbon black seems to be indicated.

(8) A resumption of the high-black high-softener compounding of GR-S seems justified both on the grounds of quality of product and of volume cost of compound.

The authors are pleased to acknowledge the criticism and review of this paper by W. B. Wiegand, director of research, and his permission to publish the data.

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Rubber Industry in New Zealand

Dunlop (New Zealand), Ltd., is to produce Dunlop tires in New Zealand early next year. In addition the new factory will also make a certain number of tires for the Goodyear Tire & Rubber Co. under a special arrangement.

When this tire factory, now under construction in the Hutt Valley, near Wellington, starts production early in 1949, two important tire manufacturers will be operating in New Zealand. In October, 1946, the Firestone Tire & Rubber Co. began to build a tire factory which turned out its first tire on June 1, 1948. The plant, which cost £600,000 (New Zealand) has a daily capacity of 500 tires and will employ 240 persons when in full production. The Dunlop factory is expected to be twice as big as any similar undertaking in New Zealand and will eventually employ 500 persons.

The latest New Zealand news indicates that large imports of hot water bottles have caused a reduction in employment in local rubber factories producing these goods; in some factories output has been stopped for several months already. Apparently over-heavy imports are also behind the cut of almost 60% in the production of cycle tires, and the laying-off of workers in the rubber boot and shoe industry.

Whether increased importations or lack of needed raw materials is responsible for the recent slowing down noted in the plastics industry here is not stated.

EDITORIALS

Another Milestone in Synthetic Rubber Progress

THE synthetic rubber industry in the United States, which has often been referred to as a modern miracle of research, development, and engineering, has passed another milestone in its progress toward economic self-sufficiency and the achievement of an equal competitive position with natural rubber. The conversion of existing facilities for the production of GR-S having a rated annual capacity of 162,000 long tons to the production of much improved GR-S polymerized at a lower temperature of 41° F. was approved by the board of directors of the government's Office of Rubber Reserve of the Reconstruction Finance Corp. on September 23. This new low-temperature GR-S capacity, which should be in operation in from six to ten months, will be in addition to the already existing capacity of about 21,000 long tons a year and will make the total capacity for the production of this type GR-S, 183,000 long tons or more annually. At the present time GR-S is being produced at the rate of about 375,000 long tons a year.

Low-temperature GR-S, the major part of the development work on which was done since the end of the late war, seems to have established itself as superior to regular GR-S and *natural rubber* for passenger-car tire treads and is being studied for possible uses in mechanical goods items and wire insulation. Some recent results indicate that low-temperature GR-S incorporates carbon black pigments faster than either GR-S or *natural rubber* and extrudes at a faster rate, giving a smoother appearing extruded specimen.

"Tests to date indicate that passenger tire treads made of the new synthetic will outwear the best natural rubber treads by as much as 30%," says United States Rubber Co. president, Herbert E. Smith.

"The results of road tests of passenger tires built with treads containing low-temperature GR-S show remarkable improvement," says a Firestone spokesman.

"Future prospects of low-temperature general-purpose rubbers are very good," says F. K. Shoenfeld, vice president of The B. F. Goodrich Chemical Co.

Prior to the announcement that the government had approved the considerable expansion of facilities for producing low-temperature GR-S, R. P. Dinsmore, vice president of the Goodyear Tire & Rubber Co., had indicated that that company would "request that government owned plants now being operated by the company be gradually changed over to production of low-temperature rubber as rapidly as new uses permit."

These events, which record the continuing progress in synthetic rubber, would seem to make it desirable to repeat certain statements made in this column in July, 1948, in connection with the need of improvement in the quality of natural rubber.

"The quality of plantation rubber from the Far East since the area was recovered following the late war has apparently gone in only one direction, *down*. Either this trend will have to be reversed, or the producers will most likely be faced with the possibility of obtaining an even lower price and an even smaller market in this country," it was said.

Since it has been reported that the cost of the low-temperature GR-S will be about only 1¢ a pound more than regular GR-S, part of the above statement may be confirmed in the course of the next few months. As far as the smaller market is concerned, this also might prove to be true, unless improvements in the quality of natural rubber are made to balance improvements in synthetic rubber. If results to date with low-temperature GR-S are equaled or bettered with the production from the new units, the market for natural rubber in the United States will be less by 200,000 long tons a year from that time on.

To return again to our statement of July, 1948, the American rubber goods manufacturer "will still pay a higher price for clean, properly graded natural rubber, but the period during which he will continue to pay much more than the price of synthetic rubber for dirty, difficult-to-handle, poorly identified, and improperly graded natural rubber is about at an end."

Another milestone in synthetic rubber progress has indeed been passed and the situation is well summarized again by Mr. Smith when he says,

"The day is brought closer when synthetic rubber will be able to stand on its own feet economically without government support."

We Begin Our Sixtieth Year

WITH this issue of India RUBBER WORLD we begin our sixtieth year of service to the rubber and associated industries, a service which was initiated on October 15, 1889, with publication of Volume 1, Number 1, of INDIA RUBBER WORLD AND ELECTRICAL TRADES REVIEW by the late Henry C. Pearson.

We like to feel this service, which was originally established "to aid materially the scientific and the mechanical development of business in india rubber, gutta percha and kindred products," has proved to be of value to our readers. With the advent of synthetic rubber we have tried to keep abreast with fast-moving developments in this field, and because of the interest of the rubber industry in allied synthetic resins and plastics, a Department of Plastics Technology was instituted in August, 1945.

We are receiving an increasing number of letters from our readers commending us for our editorial content and supporting the positions we have taken on matters of interest to the industry on our editorial page. Comment, whether favorable or unfavorable, is always most welcome.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Considerations in Favor of Large Multiple-Cavity Molds[1]

Mario J. Petretti[2]

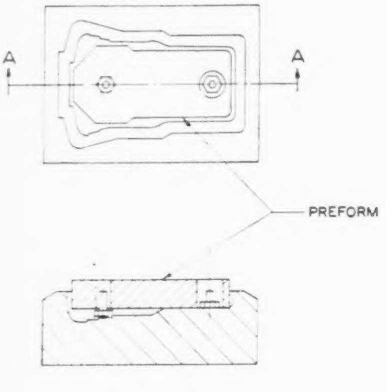


Fig. 1. Drawing of Cored Preform for Heater Plug

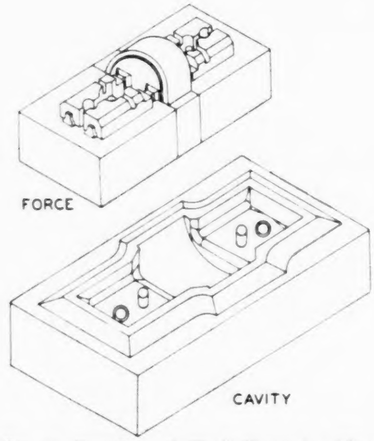


Fig. 2. Drawing of Cord Connector Plug Mold; Both Halves of the Mold Are Used in One Cavity

IN OUTLINING the considerations in favor of large molds, I feel that a step-by-step pattern should be followed from the choice of equipment, preforming, types of molds, and finishing, to the production rates and costs.

Before beginning this discussion I would like to define a large mold. A large mold, to me, is an installation of one or more molds larger than 14 by 16 inches in mold area, containing more than four cavities per mold, and run either automatically or semi-automatically in one molding press.

Molding Presses

The first equipment item is, of course, the press itself. Presses are classed in the following categories: automatic, semi-automatic, straight compression, transfer, and any combination of the foregoing. I do not intend to discuss injection presses or the injection process for there the industry has answered its own problem, that of utilizing every ounce of capacity and building the molds to the capacity of the machine itself. Basically, the thermosetting molders have not followed suit.

The press size for large molds should be a minimum of 150 tons' capacity to an economical maximum of 300 tons' capacity, allowing mold sizes from 24 by 24 inches to 30 by 36 inches, either of the ram or toggle types. The press should include machining for a top transfer cylinder regardless of the fact that straight compression molding may be the only type anticipated. The original cost for such machining is so slight that it is a good investment for the future.

For the general run of the mill, large-volume molding I believe that the 200-ton press with an allowable maximum mold size of 24 by 30 inches, and a pressure range of 70 to 200 tons, is the most economical. The cost of such a self-contained, semi-automatic press ranges from approximately $6,000 in the toggle type to approximately $10,000 in the ram type. With such equipment the molder can, if necessary, run either small molds in the 70-ton range, a series of small molds in the 200-ton range, or one large mold.

Preform Equipment

The second major piece of equipment to be considered is the preform equipment. Here the volume, type, and size of the molded parts dictate the size and the type of machine needed; either the rotary type for rectangular preforms one by 1¼ inches in size or round preforms up to 1¼ inches diameter, or the ram or toggle types for the larger preforms. Multiple-cavity preform dies are readily adaptable to the latter types. In our plant we have dies producing 14½ inch diameter preforms weighing 3½ grams each and having a weight variation of less than ¼ gram per preform.

There is a fallacy on the part of some molders to pass over rather lightly the significance of the initial preform design, which to my mind is one of the most important factors in both increased press and manhour output, especially in flash-type molds. Here it is good practice to design the preform to conform to the cavity and part contour as closely as possible. I use preforms shaped to within 1/16 of an inch of the cavity wall itself. The use of such shaped preforms cuts down rejects, reduces inspection time, and saves material. (The foregoing applies to molds of the semi-positive type.)

These shaped preforms also save placement in the mold and are adaptable to fast loading in loading boards. The loading boards should be made of either magnesium or aluminum and should incorporate provisions for both spacers and a chamfer to facilitate the loading of the board by the "shaking in" method rather than by individual placement of the preforms. By this method, for example, it is possible to load 156 cylindrical preforms in 12 seconds, and it is also applicable to rectangular and square preforms. It should be noted that it is not necessary to fill in the overflow lands with excess material in order to make a good piece. It is important to remember that in flash molding you are wholly dependent on the back pressure exerted on the material for both density and appearance of the molded part.

Another point in preform design is that of overcoming the old fear of cored preforms. Cored preforms save small pins and reduce wear in delicately designed molds. An example of a cored preform is shown in Figure 1, which is a heater plug preform used in the wiring device industry. The use of a cored preform for this part is necessitated by the length of the small diameter of the bottom knock-out pin which forms the screw hole. Another typical example is a cored preform used on one of Noma's light sockets where the use of a core pin is necessary to produce a flash-free hole in the molded part.

Types of Molds

The next consideration is that of types of molds. The question of molds is one where you can really lead with your chin, and if you lead far enough someone will take a crack at it just for luck and the chances are he'll be right. I have had one or two molds that were dreams on paper, but there must have been a slip somewhere for they proved to be nightmares. I believe that I am not the only molder who has had this experience. As this question of molds is a serious one, I cannot at this point do any more than give you the benefit of my experience.

I favor flash-type molds wherever possible, semi-positive types when necessary. I have run very successfully flash molds varying in size from 20-cavity switch plate and 200-cavity Christmas tree bulb-socket molds, to 30-cavity split bar-type molds. Under no circumstances should positive-type molds be used for multiple-cavity work.

Figures 2 and 3 show cavities used in Noma's regular production molds. Figure 2 shows a cord connector plug mold, the two halves of which are used in one cavity. The cavity was hobbed, and the force machined in three pieces, both for economy and replacement purposes. The mold itself is of 50 cavities, producing 100 molded

[1] Presented before joint meeting, Newark and New York Sections, Society of Plastics Engineers, Inc., Newark, N. J., April 14, 1948.

[2] General manager, plastics division, Noma Electric Corp., Holyoke, Mass.

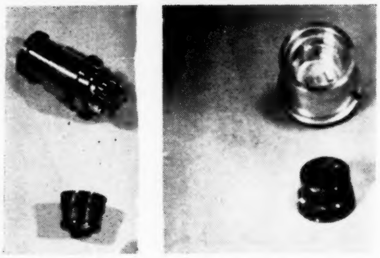


Fig. 3. *(L.)* Machined Force and *(R.)* Hobbed Cavity for Plug Made in 63-Cavity Stripper Plate Mold

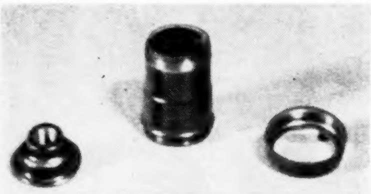


Fig. 4. Three-Piece Socket with Four Molded Threads

pieces per cycle and operating at 50 cycles per hour. This mold has been operating for two years, and to date we have not replaced a cavity.

Figure 3 shows part of a 63-cavity stripper plate mold having a hobbed cavity and machined force. This mold runs at an hourly rate of more than 35 cycles per press, with the operator running two presses. Another example is Christmas tree husks where the small size is made in 156-cavity molds, and the large size in 100-cavity molds. The 100-cavity mold is run parallel with another such mold in one press, giving us 200 pieces per cycle.

Getting away from Noma products, Figure 4 shows a three-piece socket with four molded threads used in the wiring device industry. The body of the socket was molded in a 16- or 18-cavity movable plate and removable plate mold (see Figure 5). The second part, the lock ring, was produced in a 50-cavity conventional-type stripper plate mold at 55 cycles per hour, and has a U. S. Standard 18-pitch thread. This lock ring was also molded from urea plastic, and the success attained was due to both the materials employed and the mold design. The phenolic material employed was Bakelite Corp.'s Bakelite 14317, Brown, 140 flow; while the urea material was American Cyanamid Co.'s Beetle stripping material. The cure was the important factor here, and it was necessary to control the cure time to within six to eight seconds. Using a cure time under six seconds gave an undercured part with imperfect thread; while curing more than eight seconds resulted in a cracked part. The threads were machined in the force and then string polished. The stripper plate bushings were of hardened and polished tool steel and were shouldered into the plate with a force fit with the shoulder of the bushing on the working face of the stripper plate.

The third part of the socket contains a ⅛-inch U. S. Standard pipe thread molded in by the use of removable plugs in a 28-cavity mold operating at about 35 cycles per hour, with the operator using two sets of plugs and an electrical unscrewing device. The threading edge was quite a problem here; so we molded a heavy cutoff approximately 0.030-inch thick and then with a home-made grinding device ground the outside diameter to fit the lock ring.

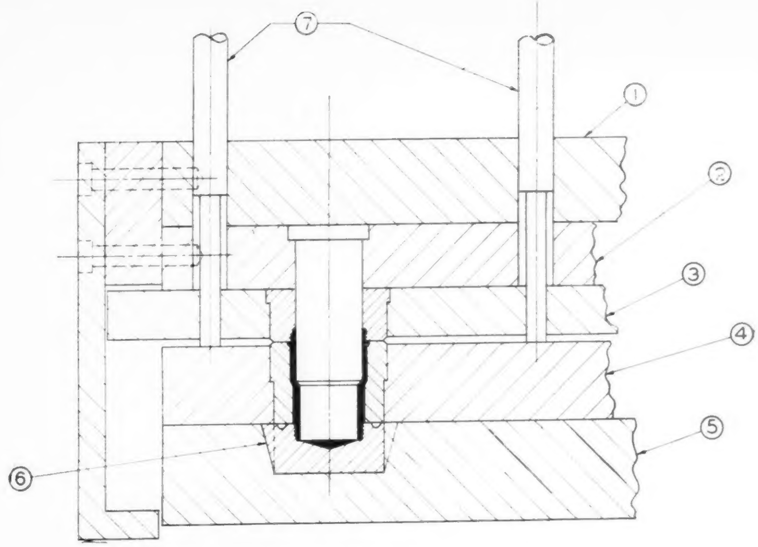


Fig. 5. Drawing of Mold for Making Socket Body

I have been quite a user of stripper plate molds and had a lot of grief for a while with clearances between force plugs and stripper bushings. I have finally reached a figure that will stand up, that of a cold clearance of 0.004-inch on the diameter. The other figure to use is that of the undercut. Here I have used a ring or series of rings 0.006-0.008-inch deep with a 0.040-inch radius. This will pull the crankiest pieces out of the cavity, and the combination of clearance and undercut will work well on stripper plates of up to 156 cavities and 25 by 28 inches in size without the use of any special molding materials.

You can use stripper molds to advantage, but learn to respect them and the necessary clearances. Too great a clearance will bind a plate just as readily as too little. Keep the molding material where it belongs, in the cavity, and build your molds with provision for maintenance. Use standard bushings and standard semi-hard plates. The stripper plates should be about ⅞-inch in thickness and made of steel having a Rockwell "C" hardness of about 30. I seem to have deviated from large molds, but I feel that the large stripper plate mold is a salvation in many types of molding.

Comparative Costs

With Christmas tree light-bulb husks, the smaller husk is molded at the rate of 9,360 pieces per hour; while the larger is molded at 9,000 pieces per hour. The relative costs of these parts at the productive rate of 9,000 pieces per hour on a large mold may be compared with parts produced in a small mold of either plunger or automatic design using 21-cavity molds for best efficiency and producing 2,100 pieces per mold per hour when operating at 100 cycles per hour. The output per large mold is therefore approximately 4¼ times that of the small mold.

The large mold represents a total capital investment of $15,700, consisting of $10,000 for one 200-ton self-contained press and $5,700 for one 156-cavity flash-type stripper plate mold. To produce the same number of pieces would require 4¼ small molds representing a total investment of $29,325. This latter figure consists of 4¼ 50- to 70-ton self-contained presses, either semi-automatic or completely automatic, at approximately $5,000 each for a total of $21,250, and 4¼ small molds at $1,900 each for a total of $8,075. On the basis of the foregoing expenditures, the large mold is more efficient and cheaper than the small mold.

With regard to the cost and value of the comparative floor spaces involved, the floor space for the 4¼ small molds and presses will be approximately 2½ times greater than that of the large mold and press. We are thereby able to utilize a further saving for the large mold if this saving in floor space is computed and evaluated, for we all agree that a square foot of manufacturing space has a specific dollar value.

There are advocates of small automatic molds and presses who feel that the labor factor is the more comparative cost factor in the operation of large *versus* small molds. I disagree with this premise on the basis that although the automatic press or mold requires no specific operator for each press, a specialized attendant is required to maintain and oversee the molds and presses on each shift that are basically producing at the rate of 8,400 pieces per hour, while the operator of the large mold is paid on a comparable basis and produces an actual 9,300 pieces per hour. As to the comparable overhead factors of large molds *versus* small molds, I will not attempt such a comparison because of the intangible factors involved.

I would like to point out that I do not attempt to compare large molds with some of the specialized rotary-type molding machines because of the highly specialized nature of these latter machines and their extremely high initial cost.

I would like to discuss briefly some of the molds used in the wiring device industry, which is a large-volume job second only to the molding of closures and buttons. I will quote some prewar figures, but must emphasize that these figures were attained before the advent of high-frequency loading board preheating and high-speed plunger molding. These developments have increased the figures by as much as 30% and have allowed the use of still larger molds.

A case in point is the switch plate which the injection molders are producing all over the country. Back in 1939 and 1940

we were producing 900 switch plates per hour in flash-type compression molds and selling them packed in cellophane envelopes with two screws for $40 per thousand. Duplex receptacles, both bases and covers, were made at the rate of 2,500 pieces per hour in 50-cavity molds. Current taps were made in 36-cavity molds at 40 cycles per hour, with one operator running two molds.

It is apparent that large molds can deliver the goods when properly designed for a job. From time to time someone will ask me how big he can build a mold. This question reminds me of a situation that was quite common back in the prewar days, that of filling in every available inch of platen area with cavities to such a degree that the press would not cut off. We could call in the material man and complain bitterly that the material was too stiff and, believe or not, that was the way soft material was developed.

Finishing

Finishing is a subject in itself, but I will endeavor to outline a few major points and their relation to large molds. The initial design of the mold is of the most importance in finishing, and the following pattern should be followed:

(1) Keep your flash cutoff to a minimum, 0.003-0.007-inch thick. This can be done in production molding. Design your molds to have sufficient cavity land area, and use full length hardened and removable land pads.

(2) Either spring or hydraulic load your ejector pins to prevent warpage and to keep your pieces on one side of the mold. A blast of air will set most pieces. If warpage persists and the normal practice of using stiffer material does not solve it (and in a majority of cases it will not on flat pieces), use a material of softer flow with a longer deflection period and jig-straighten the piece by means of an air cylinder and cooling plates. The straight wall plates that you see on the market are molded this way; the others, well they speak for themselves. Do not expect a sloppy molding job; let the mold do the work it was intended to do and thereby minimize your finishing.

In definning, or deburring as some call the process, I advocate the use of an octagonal barrel of angle iron construction, with panels of expanded steel, mounted on a Baird #1 or #2 stand, and turning at a rate of about 35-38 r.p.m. The barrel should have a diametric taper from 20 inches at the top to 36 or 38 inches at the bottom. The expanded steel panelling has enough of a cutting edge to remove all but the most stubborn flash, and the addition of wooden blocks to the barrel will remove the rest. This type of barrel is easy to clean, and contamination thus becomes a minor problem.

As for polishing or waxing the conventional method is used in either a Lupomatic or Siebert barrel. A special little stunt I used a few years ago in finishing canopy switches and similar parts may be of interest and consists of the use of burnishing cones. The cones work well in the cleaning of slots and even holes. These cones are manufactured in a variety of shapes and sizes and can be used in regular tumbling barrels with your molded parts for about 20 minutes. A small amount of hardwood sawdust should be used with the cones to provide a cushioning effect.

Summary and Conclusions

In conclusion I would like to point out that I have deliberately omitted mention of the costs of accessory equipment, such as preforming and preheating equipment because they are used with both large and small molds.

The following points will bear repetition: (1) large molds are wholly dependent on large-volume production to operate efficiently; (2) large molds must be designed to withstand the usage of 24 hours per day continuous production; and (3) the size of the large mold is contingent on the production quotas to be met, the alloted press time available, and the amount of tool cost absorption possible on the finished product.

SPE Sections Hear of Plastics Improvements

THE Chicago Section, Society of Plastics Engineers, Inc., held its first meeting of the fall season on September 14 at the Merchants & Manufacturers Club, Chicago, Ill., with approximately 80 members and guests in attendance. Speaker of the evening was M. A. Self, Bee Chemical Co., who discussed "Logoquant—Its Application to Polystyrene."

Logoquant is used to enhance the beauty and appearance of polystyrene, improve its mar and solvent resistance, and its light transmission, increase its hardness, and reduce its electrostatic charge. Mr. Self pointed out that the material can be applied by dipping or spraying and can be permitted to dry in the open air, although forced drying is preferred. For best results it is recommended that Logoquant be applied under conditions of low humidity.

Chairman William L. Hess, Anesite Corp., reported that the officers of the Chicago sections of SPE and SPI had worked out a plan to integrate the activities of the two sections by having monthly joint meetings, with the sections alternating at sponsoring the meetings. Among the benefits expected by closer cooperation between the two groups is an improvement in the caliber of the programs by concentrating the efforts of all concerned in plastics in the area on one instead of two meetings each month. The joint dinner-meetings will be held at the Builders' Club in Chicago. The two groups are inaugurating the cooperative meeting plan with a joint golf tournament on September 23 at the Westward-Ho Country Club, Melrose Park, Ill.

Improving Polystyrene Performance

The New York Section, SPE, held its first meeting of the current season on September 14 at the Hotel Sheraton, New York, N. Y. Approximately 35 members and guests heard S. E. Glick, Monsanto Chemical Co., speak on "Improved Performance of Polystyrene Injection Molded Items."

Polystyrene is finding ever-increasing use in a wide range of products of all types and sizes, the speaker said, and the subject of strain in polystyrene moldings is therefore of great interest. All polystyrene molded parts show strains whose extent and intensity depend on the method of molding. The evidence of strain or breakdowns resulting from strain in molded parts during service depends on the application of the parts. Strain relief is necessary in polystyrene parts subject to thermal stresses in service, such as in housewares, wall tiles, children's feeding trays, and others.

Polystyrene has a high thermal expansion rate, a low thermal conductivity, and a low breaking elongation. This combination of properties leads to cracking and crazing of molded parts when they are subjected to thermal stresses. To illustrate this failure in service, Mr. Glick displayed sample polystyrene children's feeding trays, molded in the shape of a duck, which had developed cracks and crazing in use. Modifications in the molding method for these trays were tested with little result, and the use of the polariscope for determining stresses in the trays before and after annealing was also unsuccessful.

Work has been done by the Plax Corp. and by Bell Telephone Laboratories in annealing polystyrene bar and sheet stocks and machine parts to reduce stress. This work has been quite successful, the speaker noted, and employs benzine to reveal stress cracks in molded parts. Little work has been done to date, however, on injection molded polystyrene parts. After some experimentation Monsanto settled on Varsol #2, a more standardized product than benzine, for determining the presence of stress cracks in the feeding trays. A few drops of Varsol or even immersion of the complete tray in the solvent quickly revealed the presence of stress cracks that would appear in service.

Investigation revealed that the use of hotter dies and longer mold cycles gives less strain in polystyrene injection molded parts. This method is of some value, Mr. Glick stated, but best results are obtained by annealing the parts after molding. This annealing or tempering operation will reduce stresses to a point where they will have no effect on service and gives satisfactory results even when used on parts molded with cold dies and short cycles. Annealing of the feeding trays, molded of Monsanto's Lustrex, a heat-resistant grade of polystyrene, gave excellent results, and the trays are proving satisfactory in service. Annealing can be done by placing the trays into either an oven or a water bath for five minutes at 190° F. or 15 minutes at 150° F. and was found to improve performance of the trays in a strain test by 15 times.

Some applications involving stress failure of polystyrene parts in service can be solved by modifications in molding or by the use of standard polystyrene which is less subject to strain than the heat-resistant grade. The best method for strain relief is the use of annealing, the speaker concluded, although results to date are recognized as being preliminary, and further work is continuing.

At the start of the meeting, president Arthur Nufer, Bakelite Corp., spoke briefly welcoming the members to the Section's first session of the season. He announced that the October meeting would feature a talk on "Beryllium Bronze Cavities and Forces for Injection Molds," by a speaker from Process Mold Engineering Co., and that the November and December meetings would be on the subjects of plating of plastic molded parts, and painting and decorating of plastics, respectively.

Laminates Discussed

Approximately 35 members and guests attended the first dinner-meeting of the current season of the Central Ohio Sec-

tion, September 9, at the Beechwold Restaurant, Columbus. After a short business session in which W. J. Braley, Columbus Plastics Products, Inc., was named a director of the group to replace Nathan Roop who resigned, two speakers were heard.

George Alexander, General Electric Co., dealt with "Laminates." Mr. Alexander presented a very interesting picture of the laminating industry, dividing his discussion into binders, reinforcements, and laminating methods and also covering applications of various types of plastics. Of particular interest was a combination of silicone resin and Fiberglas which was found to be excellent for heat-resistant electrical insulation. The speaker pointed out that the laminating industry has not been "glamorized," probably because 98% of its production is used in industrial application, but he pointed out that decorative laminates are growing in demand for such uses as table tops.

The second speaker, C. F. Lucks, Battelle Memorial Institute, talked on "Technology—the Hub of Better Living." Mr. Lucks' talk was popular in nature and included a number of demonstrations of physical phenomena in the field of electricity and magnetism. The general theme of the talk was that all sciences are interrelated and dependent on one another.

The group's next meeting, on October 14, will consist of a trip through the General Electric laminating plant at Coshocton, O., followed by a dinner in the company cafeteria.

Aging of Geon Polyblend

AIR oven aging tests conducted on formulations of Geon Polyblend 500 X 503, made by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O., show this material to be superior to polyvinyl chloride plasticized with the common ester-type plasticizers for applications where resistance to elevated temperatures is important. Tests were conducted at 212° F. for five days in a circulating air oven by Goodrich Chemical.

At 250° F. properly stabilized polyblend retained 85% of its original elongation; whereas polyblend which was incompletely stabilized and polyvinyl chloride plasticized with tricresyl phosphate and with dioctyl phthalate retained less than 15%. The importance of stabilizing both the vinyl and Hycar portions of the polyblend is emphasized by these results. The properly stabilized polyblend contained basic lead stearate to stabilize the vinyl portion, and AgeRite Stalite to stabilize the Hycar portion. The incompletely stabilized polyblend, which retained about 15% of its original elongation, was stabilized only with basic lead carbonate.

There are many applications where combinations of polyvinyl chloride and polyblend give properties superior to either material used alone. This point is particularly true when high tensile strength is needed than can be obtained with polyblend alone. The addition of plastic to polyblend improves the tensile strength of the resultant compound roughly in proportion to the amount of plastic added. The limiting factor in this addition may be either the migrating tendency of the liquid plasticizer, or the fact that with low concentrations of polyblend the stock harden excessively upon extended aging at elevated temperatures.

This latter point was illustrated by an aging test of plastic-polyblend combinations containing 0, 20, 40, 60, 80, and 100% plastic. The change in physical properties upon aging at 250° F. was fairly constant for all the combinations at the end of 24 hours, but after 120 hours the 100% plastic compound showed appreciable deterioration. After 192 hours, while all the compounds showed a sizable decrease in physical properties, all of these properties changed about the same amount except for the compound containing 80% plastic which had become very hard and the 100% plastic compound which had become so brittle that it broke upon bending.

A comparison of moduli at 100% elongation of these plastic-polyblend compounds showed that the change in modulus with aging increases as the percentage of polyblend decreases. The variation is quite regular except at 192 hours, aging where a marked increase in modulus change is noted for a mixture containing 20 parts or less of polyblend. This corresponds to a Hycar content of less than 15% and indicates the limiting conditions for the combining of additional resin with polyblend.

Pliovic—Goodyear Resin

PLIOVIC, a modified vinyl copolymer type of resin, has been made available to the plastics industry by the chemical division, Goodyear Tire & Rubber Co., Akron, O., after the completion of development work and almost a year of use in actual production of finished materials. According to H. R. Thies, division manager, the resin possesses several processing advantages of interest to the fabricating trade.

Although displaying the inherent toughness of high vinyl copolymers, the chemical nature of Pliovic is such that it requires less plasticizer and is easier to process than most of the similar high molecular weight materials now on the market. In addition, the resin can be used to produce organosols which fuse with less heat than conventional organosols and produce films which heat seal at lower temperatures, it is further claimed.

Pliovic is supplied as a white granular powder which is odorless, tasteless, and does not support combustion. Two grades are available: Pliovic A for general use, and Pliovic AO for organosols. Typical applications to date are calendered film and flooring, extruded tubing and hose, and as an organosol in dipped goods and coated fabrics.

The new resin will be featured at the National Plastics Exposition along with another new Goodyear resin, Tuf-Lite, a high styrene copolymer resin which is said to offer toughness, high impact resistance, low water absorption, good tensile strength, and excellent electrical properties.

Polyethylene Laminated Paper

THE development of a new process for laminating polyethylene plastic film to paper has been announced by Floyd A. Holes Co., Bedford, O. The paper laminate is an excellent moisture barrier and can be used to exclude liquids and moisture vapors while containing powders or solids. The laminates can be used for bulk packaging of hygroscopic materials, as jar and bottle cap liners, as liners for cartons and barrels, and as lining materials in the rubber industry to prevent adhesion of uncured stocks.

The polyethylene-paper laminates can be made with papers ranging from a tissue to a medium weight board and can be heat sealed with ordinary equipment. The plastic film, it is claimed, is nonblocking and unaffected by salt water, active solvents, and dilute or concentrated acids such as sulfuric, hydrochloric, nitric, and hydrofluoric. Additional features include flexibility over a wide temperature range, complete absence of odor and taste, resistance to humidity changes and ultraviolet light. The laminates can be furnished in thicknesses ranging from 0.001-0.004-inch to meet the requirements of most packaging and industrial applications. In special applications polyethylene can also be laminated to metal foil, paper, and cloth.

New Heat Resistant Polystyrene

A NEW high heat resistant, low shrinkage polystyrene plastic, embodying three important characteristics not previously attained in material of this type, was revealed by the chemical division of Koppers Co., Inc., Pittsburgh 19, Pa., on September 24 at a luncheon of chemical and plastics publication editors in the Waldorf-Astoria Hotel, New York, N. Y. The new plastic, called Koppers Polystyrene P-8, is expected to open new fields of application for this material, according to Dan M. Rugg, vice president and general manager of the Koppers chemical division.

Special new qualities of the material, Mr. Rugg said, are: (1) it is the first high heat resistant polystyrene that can be molded into a crystal product as well as in every color of the rainbow; (2) it molds as easily as do regular grades of polystyrene, whereas other heat resistant grades require modifications in the molding procedure; and (3) when made in colors, the new plastic shows great resistance to fading even when subjected to extended immersion in boiling water. These properties were graphically portrayed at the luncheon by immersing rulers, tea strainers, and radio cabinets made of general-purpose polystyrene and the new P-8 for 10 minutes in boiling water. The products made with the general-purpose grade warped very badly; while the P-8 products appeared entirely unaffected.

The new plastic is being made at the company's Kobuta, Pa., plant by an entirely different process developed by the Koppers research staff. Under this process control of manufacture is so stabilized that Koppers is able to produce and sell P-8 without charging a premium price over that of regular polystyrene, Mr. Rugg said. All previous heat resistant grades have been sold at prices above those of regular grades.

Molding cycles for P-8 are as short or shorter than with general-purposes types, according to E. Y. Wolford, company plastics engineer. P-8 has a short chill or cure time which saves molding time and reduces cost per piece. The new material can be molded in compression, injection, or extrusion machines using the same molding conditions as for regular polystyrene except for a 25-50° F. higher molding temperature.

Scientific and Technical Activities

Additional Experimental GR-S Polymers and Latices

ADDITIONS to the list of experimental GR-S dry polymers and GR-S latices, available for distribution to rubber goods manufacturers under the conditions outlined in our November, 1945, issue, page 237, appear in the table which is printed below.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of one bale or two bales upon request to the Sales Division of Rubber Reserve, or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

X-Number Designation	Manufacturing Plant	Date of Authorization	Polymer Description
X-466-SP-GR-S	U. S. Rubber, Naugatuck	6/1/48	Similar to GR-S-10, 72/28 butadiene styrene charge ratio; 0.05-part hydroquinone per 100 parts of monomers; Stalite antioxidant; 90-110 Mooney.
X-467-GR-S	Firestone, Lake Charles	6/23/48	Regular GR-S-AC except shortstopped with 0.05-parts hydroquinone per 100 parts of monomers; 1.50% HAC antioxidant; 40-50 Mooney.
X-468-GR-S	Goodyear, Torrance	7/14/48	Similar to standard GR-S except 4.0 parts fatty acid soap: shortstopped with 0.2-part hydroquinone per 100 parts of monomers; approximately 60 Mooney; somewhat low conversion.
X-469-GR-S	Goodyear, Torrance	7/14/48	Similar to standard GR-S except 4.0 parts fatty acid soap; shortstopped with 0.2-part hydroquinone per 100 parts of monomers; approximately 60 Mooney; low conversion.
X-470-GR-S	Goodyear, Torrance	7/14/48	Similar to standard GR-S except 4.0 parts fatty acid soap; shortstopped with 0.2-part hydroquinone per 100 parts of monomers; approximately 50 Mooney; somewhat low conversion.
X-471-GR-S	Copolymer, Baton Rouge	7/19/48	Copolymer of 71 butadiene, 29 styrene charge ratio made at 41° F.; cumene hydroperoxide activated recipe with potassium rosin soap emulsification; 55 Mooney. Shortstopped with 0.15-part ditertiary butyl hydroquinone per 100 parts of monomers.
X-472-GR-S	Copolymer, Baton Rouge	7/13/48	Copolymer of 71 butadiene, 29 styrene charge ratio made at 41° F.; cumene hydroperoxide activated recipe with rosin soap emulsification. Shortstopped with ditertiary butyl hydroquinone; 60 Mooney; 1.25% Stalite antioxidant.
X-473-GR-S	General, Baytown	8/20/48	A mixture containing 50±2 parts of reinforcing furnace black and 100 parts GR-S. Mooney equivalent to 45±4 on finished unpigmented polymer. Stabilized with 1.5% PBNA.
X-474-GR-S Latex	U. S. Rubber, Naugatuck	7/15/48	Improved X-429-GR-S Latex. Formula same as for GR-S except slightly more soap. pH, 8.5-9.25. Total solids, 26.5-29.0%. Mooney of contained polymer, 115-130.
X-475-GR-S	U. S. Rubber, Borger	7/15/48	A mixture containing 50 parts Philblack A and 100 parts of GR-S polymer as used in GR-S Black-1 (37 Mooney). Stabilized with 1.5% BLE.
X-476-GR-S	Goodyear, Torrance	7/28/48	Copolymer of 72 butadiene, 28 styrene charge ratio made at 41° F.; cumene hydroperoxide activated recipe with rosin soap. Shortstopped with 0.2-part ditertiary butyl hydroquinone per 100 parts of monomers. Antioxidant, 1.25% BLE. Mooney, 60±5.
X-477-GR-S	Goodyear, Torrance	7/28/48	Same as X-476-GR-S, except Mooney of 50±5.
X-478-GR-S	Copolymer, Baton Rouge	7/23/48	Copolymer of 71 butadiene, 29 styrene charge ratio made at 41° F.; cumene hydroperoxide activated recipe with potassium rosin soap emulsification; 55 Mooney. Shortstopped with 0.15-part dinitrochlorobenzene per 100 parts of monomers.
X-479-GR-S	U. S. Rubber, Borger	8/2/48	Copolymer of 71 butadiene, 29 styrene charge ratio made at 41° F.; cumene hydroperoxide activated recipe with rosin soap emulsification. Shortstopped with 0.2-part ditertiary butyl hydroquinone per 100 parts of monomers; 45-55 Mooney. Stabilizer, 1.25% BLE. Same as X-432-GR-S except for Mooney viscosity range.

Synthetic Rubber Developments

A TALK on "Some Recent Developments in Synthetic Rubber," by W. K. Taft, pilot-plant manager, Government Synthetic Rubber Research Laboratories, University of Akron, Akron, O., featured the September 16 meeting of the Southern Ohio Rubber Group. Attended by some 100 members and guests, the meeting took place at the Engineer's Club of Dayton. Following the dinner a short business session was held during which Chairman R. S. Radow, Inland Mfg. Division, General Motors Corp., announced that the Group had been voted sponsorship by the Division of Rubber Chemistry, A. C. S.

Mr. Taft said that in 1941 it was observed that synthetic polymer produced at 95° F. was superior to GR-S polymerized in accordance with a similar formulation at 122° F., but required a considerably longer reaction time to obtain the same conversion level (approximately 77%). Unsuccessful investigations with redsol (mixed potassium and sodium ferricyanide) were made in 1943. In 1945 active work was carried out on polymerizations conducted not only at lower temperatures, but also at lower conversion levels and utilizing a redox system. Concurrently the time required for a GR-S type of polymerization was markedly reduced by the use of the diazo thio ethers, especially MDN, in combination with potassium ferricyanide.

Subsequent work in 1946 showed that TDN (tolyl diazo thio beta-naphthol) polymer prepared at 41-50° F. exhibited 58% improvement in roadwear in tires and was three to six times as good as standard GR-S in resistance to cut growth. In the same year polymerizations were conducted at 41° F. on a pilot-plant scale, using cumene hydroperoxide (CHP) as the catalyst. After road tests these polymers appeared to be superior to production GR-S and at least as good as natural rubber with respect to tread wear, Mr. Taft stated. At present, CHP polymers prepared at and below 14° F. are being evaluated, and active investigations are being made of continuous rather than batchwise polymerizations at low temperature, elimination of sugar as the reducing agent, and proper shortstopping and drying.

The Group will hold a dinner-dance on December 10 at the Miami Valley Country Club, Dayton.

Boston Group Meets

TWO speakers featured the September 24 meeting of the Boston Rubber Group in the Somerset Hotel, when 295 members and guests heard W. B. Reynolds, Phillips Petroleum Co., discuss "Low-Temperature Polymers," and Jimmy Kelley, *Boston Herald Traveler*, give "An Inside Story of the 1948 Olympics." Dr. Reynolds' talk was identical with that which he gave before the June 11 meeting of the Philadelphia Rubber Group, (see page 544 of our July issue). Mr. Kelley reported on the Olympics and, in particular, the marathon race.

The Group will hold its annual business meeting and Christmas Party on December 17 in the Somerset Hotel.

Hycar-Phenolic Molding Powder

A NEW Hycar-phenolic molding powder which will provide high shock resistance characteristics to instrument cases, knife handles, power tool handles, and a variety of other applications which undergo rough treatment has been developed by the compound division, chemical department, General Electric Co., Pittsfield, Mass. The new compound has the good moldability and heat resistance of woodflour-filled phenolics and is strengthened by the toughness and resilience of Hycar rubber, made by B. F. Goodrich Chemical Co., to the point where it can replace cotton flock and rag-filled compounds for many applications.

Tests of the new compound, designated as G-E 12446, indicate its impact resistance to be many times more than that of standard woodflour-filled phenolics. It possesses low bulk factor, excellent thermal shock resistance, excellent powder pourability, provides good finish, and can be preformed rapidly in automatic equipment. The material can be molded into complex parts by either compression or transfer methods in molds designed for ordinary woodflour-filled phenolics. The inherent resiliency of the compound permits it to be molded around large, complex inserts without cracking, and around inserts subjected to flexing and vibration.

NEWS of the MONTH

Highlights—

Further information on postwar expansion of the industry was found in statements by the United States Rubber Co. and the Firestone Tire & Rubber Co. made during September. The former company reported an expenditure of 80 million dollars in this connection. The Office of Rubber Reserve approved conversion of existing facilities having a rated capacity of 162,000 long tons a year to the production of low-temperature GR-S. Consumption of rubber in the United States for July and August was higher than for corresponding months in 1947. Exports of rubber and rubber products during July, 1948, were higher than during the two preceding months.

The national convention of the United Rubber Workers of America, CIO, in Omaha, Neb., reelected L. S. Buckmaster president of the international union by a vote of 810-808, put the opposition, as evidenced by this close vote, made considerable progress in this and in other matters of union policy of direct interest to the rubber industry.

The four-month-old strike at the Sun Rubber Co., Barberton, O., ended September 9. The entry of Pharis Tire & Rubber Co. into the manufacture of products other than tires (in addition to those already made by subsidiaries) at some other location than Newark, O., is being considered by stockholders of the company.

Increased Output of Low-Temperature GR-S Approved; Rubber Consumption Continues High

During September there were further evidences that the postwar expansion of the rubber goods industry was permanent and geared to a definitely higher than prewar demand for its products. Herbert E. Smith, president of United States Rubber Co., revealed that that company had spent 80 million dollars for expansion and modernization since V-J Day. It became known that as a result of requests from several major rubber companies for an expansion of the production facilities for GR-S polymerized at lower than standard temperatures, the Office of Rubber Reserve had approved conversion of facilities having a rated capacity of 162,000 long tons a year to the production of this improved GR-S rubber.

Exports of rubber products for July, 1948, although considerably lower than for July, 1947, were higher than for the two previous months, and truck and bus tires established a high for 1948 in July.

Total new rubber consumed in July was less than for June because of vacation and inventory shutdowns, but was higher than for July, 1947. In fact, consumption of new rubber for the first seven months of 1948 was only 3% less than for the first seven months of 1947.

The strike at the factory of the Sun Rubber Co. in Barberton, O., which lasted four months, ended on September 9, when company officials and representatives of the URWA signed a new contract. Bids for the plant, equipment, and land of the Pharis Tire & Rubber Co., Newark, O., are being taken, and it appears likely that this company will discontinue all production operations at that location.

The national convention of the URWA in Omaha, Neb., during the week of September 20, saw a struggle for the top executive posts. L. S. Buckmaster was reelected president by the narrow margin of 810 to 808 votes. The opposition party however, retained in office Vice President H. R. Lloyd and Secretary-Treasurer C. L. Lanning.

Industry's Postwar Expansion Continues

The statement of Herbert E. Smith in which the postwar achievements and plans of U. S. Rubber are recorded, may be added to similar statements of two other leading industry executives reported in our September issue.

U. S. Rubber has spent $80,000,000 since V-J Day for expansion and modernization of plants producing hose, belting, friction tape, insulated wire, and other special rubber products used by the oil, automobile, electrical, railroad, steel, and other major industries. Of this total expenditure, $30,000,000 has been used to improve tire production facilities. Additional millions have been invested in new facilities for the production of chemicals, textiles, and plastics.

New plants placed in operation by this company since the war are located as follows: Chicago, Ill., plastics and specialities; Washington, Ind., raincoats; Fort Wayne, Ind., engineered rubber products; Scottsville, Va., rayon tire cord; Burlington, N. C., new textile products; Milan, Tenn., sport footwear; Manchester, N. H., Lastex yarn and rubber thread; and Gastonia, N. C., combed cotton yarn.

Meanwhile an expansion program to more than double the output of foamed latex rubber at the Fall River, Mass., plant of the Firestone Tire & Rubber Co., has been announced by Harvey S. Firestone, Jr., president of that company. The formation of the Firestone Plastics Co. and the concentration of all activities in this field at the Pottstown, Pa., plant are also a recent development.

More Low-Temperature GR-S Production Approved

Expansion of government-owned synthetic rubber producing facilities for making GR-S at lower than standard temperature is being urged by the rubber goods industry. Much improved performance of tire treads with this new type of GR-S has resulted in requests by operators of several GR-S plants that the ORR convert a considerable portion of the capacity of these plants from standard to low-temperature GR-S. Copolymer Corp. is producing about 1,000 tons a month, and U. S. Rubber about 200 tons a month of low-temperature rubber, and both have asked ORR to convert additional facilities to this-type rubber. Goodyear Tire & Rubber Co., which is also producing a small amount of the new rubber at the plant operated in Torrance, Calif., and also Firestone and The B. F. Goodrich Co. are all interested in having a part of the production facilities in plants they operate for the government converted to the production of low-temperature GR-S.

The industry is investigating the use of low-temperature GR-S for many other rubber products including mechanical goods and insulation.

G. B. Hadlock, director of Office of Rubber Reserve, in reply to an inquiry from India RUBBER WORLD with regard to the plans of that agency to convert existing facilities to the production of low-temperature GR-S, stated that at a meeting of the board of directors of ORR on September 23, conversion of facilities having a rated capacity of 162,000 long tons a year had been approved. He estimated that the new production capacity for this low-temperature rubber should be in operation within the next six to ten months.

The location of the government synthetic rubber plants at which this low-temperature GR-S will be produced and the new capacity available in each instance follow: Baton Rouge, La., 15,000 long tons; Lake Charles, La., 30,000; Port Neches, Tex., 15,000; Houston, Tex., 30,000; Los Angeles, Calif., 15,000; Baytown, Tex., 30,000; and Borger, Tex., 27,000.

The changeover will involve installation of the necessary insulation and refrigeration equipment to enable the polymerization of the butadiene and the styrene to be carried out at 41° F. instead of the standard 122° F. In addition, it is understood that a decision must be made in each instance whether or not to use the continuous polymerization process for low-temperature GR-S production or the batchwise system. Successful operation of the pilot plant at the Akron Government Evaluation Laboratory with the continuous process for low-temperature GR-S has been achieved.

At the present time the plants at Lake Charles, Port Neches, Borger, and Houston operate on the continuous polymerization process for regular GR-S; while the plants at Baton Rouge, Baytown, and Los Angeles make regular GR-S by the batch process. Therefore the capacity at the first four plants could be converted to the production of low-temperature GR-S by continuous polymerization somewhat more easily than the last three plants mentioned.

Actually the total available rated capacity for the production of low-temperature GR-S when these new facilities are completed will be 183,000 long tons annually. There is in operation at present 15,000 tons annual capacity at Baton Rouge; 3,000 tons at Borger; and 3,000 tons at Naugatuck, Conn.

Plant Disposal Plans

According to Lockwood's September 15 *Rubber Report*, an interagency government commitee is being organized to formulate recommendations for the disposal of the synthetic rubber plants, which recommendations are to be presented to the President and the Congress prior to April 1, 1949. A Rubber Industry Advisory Committee has been formed, and chemical

ESTIMATED WORLD PRODUCTION AND CONSUMPTION OF NATURAL RUBBER—1948

(In 1,000 Long Tons)

Month	Production			Consumption			
	Malaya	Other	Total	U. S.	U. K.	Other*	Total
Jan.	62.1	60.4	122.5	58.2	18.1	43.7	120.0
Feb.	50.7	51.8	102.5	51.0	16.0	35.5	102.5
Mar.	58.5	64.0	122.5	54.4	15.8	42.3	112.5
Apr.	66.5	61.0	127.5	50.6	18.6	40.8	110.0
May	49.7	67.8	117.5	52.0	14.7	40.8	107.5
June	60.6	74.4	135.0	55.7	15.5	43.8	115.0
July	58.2	71.8	130.0	48.8	16.2	45.0	110.0

ESTIMATED WORLD STOCKS OF NATURAL RUBBER

(In 1,000 Long Tons)

1947	Producing Countries			Consuming Countries			Grand Total
	Malaya	Other	Afloat	U. S.†	U. K. Govt.	Other‡	
Dec.	140.3	89.7	240.0	129.0	91.0	160.0	850.0
1948							
Jan.	146.5	91.0	227.5	136.2	90.7	155.6	847.5
Feb.	135.3	79.7	232.5	148.1	90.0	161.9	847.5
Mar.	144.1	80.9	225.0	130.3	89.1	160.6	830.0
Apr.	161.4	78.6	212.5	123.3	88.7	168.0	832.5
May	141.6	78.4	230.0	112.7	88.5	173.8	825.0
June	140.7	74.3	260.0	119.8	88.4	166.8	850.0
July	145.0	80.0	257.5	128.8	88.0	181.2	880.5

*Including imports into Russia, but no rubber of Russian origin.
†Not including U. S. strategic stocks.
‡Not including stocks in Russia.
SOURCE: Rubber Division, Office of Domestic Commerce, and Secretariat of the Rubber Study Group.

and petroleum industry committees are also being formed. The committees will be composed of top level officials from the three industries and will advise with the government representatives in connection with the disposal plans to be presented.

Lockwood's *Report* also points out that there is a lot of hard thinking in top government agencies in Washington about the end of the existing Rubber Act of 1948 in 1950 and how to keep developments in synthetic rubber going if the industry does not show any interest in the purchase of the plants or offer a how-to-consume-enough-synthetic-rubber-voluntarily plan.

Production and Export Figures

The regular monthly report of The Rubber Manufacturers Association, Inc., on tire production and shipments gave shipments of passenger-car tires for July as 6,559,976 units, an increase of 1.2% over June. Production of passenger-car tires in July totaled 5,516,349, down 12.4% from June. The lower production caused inventories to drop 11.5% to 8,253,829.

Shipments of truck and bus tires during July amounted to 1,305,968 units, down about 3% from June. Production was lower by 10.2% to 1,155,797 units, and inventories decreased to 1,952,751 units.

Tube shipments were slightly higher in July at 6,807,414. A drop in production of 14.4% resulted in an inventory of 8,760,344 units, as compared with 9,938,986 tubes on June 30.

The complete report will be found on page 132.

Led by large shipments of truck and bus tires, United States domestic exports of rubber products, rubber, and allied gums, amounted to $11,765,619 in July, the Rubber Division, ODC, Department of Commerce, reported early in September. The July export figure was $100,000 above the June total, but was 33.4% below the figure for July, 1947.

Shipments of transportation items (tires, tubes, camelback, and tire repair materials) constituted 68.2% of the July total. The 133,999 truck and bus tires exported was the highest figure for the year for these items. Valued at $5,980,587, these tires represented 50.8% of all exports in the rubber group, an unprecedented proportion, it was said. Germany was the chief destination, taking 25,399 truck and bus casings, valued at $1,517,971.

Exports of automobile inner tubes, an export classification which includes truck and bus tubes, also were at the year's high of 127,058 items, valued at $493,973. Shipments of passenger-car tires again declined, amounting to only 40,972 tires, value $622,456.

Another measure of industry activity, the monthly report of the Rubber Division, ODC, Department of Commerce, on rubber consumption and imports showed total new rubber consumed in the United States in July amounted to 83,286 tons, compared with 94,905 tons in June. For the second consecutive month consumption was higher than for a similar period in 1947.

For the first seven months of 1948 new rubber consumption was 630,959 tons, a decline of 3% from the 649,980 tons consumed in the first seven months of 1947. Consumption of natural rubber in July was 48,775 tons, including 1,748 tons of latex; both figures were the lowest for any month this year. Synthetic rubber consumption at 34,511 tons was also the lowest recorded for 1948. Included in the synthetic total were 27,067 tons of GR-S, 4,700 tons of Butyl, 2,197 tons of neoprene, and 547 tons of nitrile type synthetics. July is the usual month for vacation and inventory shutdowns in the rubber goods industry.

Consumption of GR-S in July was 32.5% of total new rubber, and consumption of Butyl was 5.6% of total new rubber.

Imports of natural rubber amounted to 63,715 tons in July and were featured by the highest imports since the war from Netherlands India, amounting to 10,530 tons, including the first postwar arrivals of latex from that source.

Imports of latex were 3,654 tons, the highest for any month this year. Industry stocks of natural rubber at the end of July were reported at 128,806 tons, including 11,318 tons of latex, against 119,818 tons on June 30.

Production of GR-S declined from 35,446 tons in June to 33,308 tons in July; while stocks on hand rose 6,678 tons to a new 1948 high of 78,079 tons. Butyl stocks increased slightly and stood at 10,090 tons at the end of July just before production at Baytown, Tex., was interrupted by a fire on August 3.

The RMA, late in September estimated rubber consumption for the first eight months of 1948 at 723,065 long tons, contrasted with 736,270 long tons for a comparable period in 1947.

For the year to date natural rubber consumption totaled 423,758 tons, against 346,458 tons last year, and total synthetic consumption amounted to 299,307 tons, compared with 389,812 tons for the previous year.

August consumption of new rubber was estimated at 92,106 long tons, an increase of 10.6% over July, when interruptions in rubber goods production on account of vacations and maintenance work caused less rubber to be consumed. Natural rubber consumed in August was estimated at 53,014 tons, an increase of 8.7% over July. Total synthetic consumption was estimated at 39,092 tons, up 13.3% over July.

World Natural Rubber Production and Consumption

World production of 130,000 tons of natural rubber in July was reported by the Secretariat of the Rubber Study Group, the Department of Commerce announced on September 20. This figure, only 5,000 tons below the June, 1948, postwar record, brings total world output for the first seven months of the current year to 855,000 long tons.

Higher prices for rubber in June and July brought out increased shipments from Netherlands India, more than offsetting the effects of disturbances in Malaya, which reduced production by smallholders there in July, it was said by E. G. Holt, Rubber Division, ODC.

World consumption of natural rubber in July, including total imports into Russia, is estimated at 110,000 tons, bringing the total for seven months to 777,500 tons. The indicated excess of production over consumption for the seven-month period was 77,500 tons.

The accompanying tables give detailed monthly statistics for 1948 world production, consumption, and principal stocks of natural rubber.

The United States is to receive 25,000 long tons of high-grade natural rubber from the British Government stockpile as a result of a transaction under the Economic Cooperation Agreement, it was announced September 9 from Washington by Evan Just, director of ECA's Strategic Materials Division. The rubber will be added to this country's stockpile, and the deal is the first step toward carrying out the Congressional aim of assuring a continuing flow of critical war materials in return for Marshall Plan aid.

World production of synthetic rubber is estimated at 317,500 tons, and consumption at 282,500 tons, for the seven months, not including statistics for Russia. Total world consumption of new rubber, excluding Russian synthetics, therefore was 1,060,000 tons during the first seven months of 1948.

Brake Lining Association Dissolved

The Brake Lining Manufacturers Association, Inc., was dissolved and with 17 of its corporate members and nine officials of the concerns was fined a total of $152,000 through an order signed by Federal Judge Edward A. Conger in New York, on September 21. This action followed the defendants' pleas of *nolo contendere* to three indictments charging violation of the anti-trust laws.

The indictments, returned by a federal grand jury in August, 1947, were dismissed earlier as to the Firestone Tire & Rubber Co. and the Firestone Tire & Rubber Export Co., both of Akron, O., and a number of individuals.

The defendants were charged with entering three separate conspiracies to fix prices, discounts, classifications of customers, and terms and conditions of sale on

replacement brake lining and clutch facings.

Fines of $15,000 each were imposed on the Association; American Brake Shoe Co., Detroit, Mich.; Grizzly Mfg. Co., Bell, Calif.; Raybestos-Manhattan, Inc., Passaic, N. J.; and The Thermoid Co., Trenton, N. J. Lesser fines were imposed on other companies and individuals.

Lester D. Stickles, attorney for the trade association, said that trial of the case would have involved calling hundreds of witnesses and presenting truckloads of evidence. He said that the industry could not afford to spare top management for a long period of time when it was trying to catch up with the country's production needs. Asserting that the violations charged were based on procedures established at the insistence of the National Recovery Administration, Mr. Stickles said that these procedures had resulted in standardization of sizes and in other uniformities which had benefited the industry and brought substantial savings to the public. For this reason the practices had been openly adopted and followed as accepted customs of the trade with no effort being made by members of the Association to conceal them, he added.

Du Pont Anti-Trust Investigation

An investigation of E. I. du Pont de Nemours & Co., Inc., by the anti-trust division of the Department of Justice was scheduled for Chicago during the week of September 27, according to a report in the *New York Times* on September 25. According to an official of the Department of Justice in Washington, anti-trust actions were being intensified, and it was indicated that the program to break monopolies would develop into the most ambitious in history. A principal part of the drive is against food, clothing, and housing combinations.

In the du Pont inquiry, subpoenas calling for books and records were also served on General Motors Corp., North American Aviation, Inc., United States Rubber Co., the Ethyl Corp., and Kinetic Chemicals, Inc.

It was also reported that subpeonas had been issued against the top officials of the du Pont company, Bendix Aviation Corp., Remington Arms Co., Christiana Securities Co., Du Pont Securities Co., General Industries Co., Delaware Realty & Investment Corp., and Rubber Securities Co.

The subpeonas were returnable before the federal grand jury in Chicago on September 30 and will be studied by federal lawyers before they decide on civil or criminal action, it was said. The government proceeded through the grand jury because the corporations refused to provide the records voluntarily.

The present du Pont company, which operates 85 plants in 25 states, was created in 1915, following a Delaware court order holding that the explosives business of the company established in 1802 was a monopoly. This 1915 order resulted in the establishment of the Hercules Powder and Atlas Powder companies.

A spokesman for du Pont said that the company would make no comment on the government's action at this time.

URWA Convention

The national convention of the United Rubber Workers, CIO, was held in Omaha, Neb., during the week beginning September 20. For some time prior to this meeting it had been evident that there would be a contest for the top executive positions of the international union, and that the president, L. S. Buckmaster, would be opposed for reelection. George R. Bass, president of the local union at the Akron, O., plant of the Goodrich company, was the leading contender for the top post.

Mr. Buckmaster, who has been criticized for not putting up a stronger fight in bargaining with the Big Four rubber companies, released a report to the members of the union on the eve of the convention in which he charged some field representatives and certain officials of the international union of political maneuverings. The board of directors of the union, he said, failed to give the membership "emphatic and vigorous leadership in the field of civic and national affairs."

"This failure of the board to act decisively has left many of our members and the nation with the impression that our union actually supports the third party, which, I believe, is a tool of the Communist party," Mr. Buckmaster declared.

Mr. Bass was running for president of the international union on a platform calling for "one union, one contract." He promised to fight for industry-wide bargaining throughout the rubber industry. He is also in favor of the six-hour day for the entire rubber industry and has stated that with the present mechanization in the industry there is no reason why anyone should work more than a six-hour day. Production can be maintained with a fair profit to the companies, and wages for workers can be kept on a par, or better, with earnings from present eight-hour day schedules, Mr. Bass contended.

The URWA lost 19,500 members during the past year; 11 new local unions were chartered, and 20 others were either declared defunct of their charters were revoked. The total number of local unions is 246. The actual paying membership of the union is about 135,000. The union is carrying 189,436 on its rolls, but many of these are honorary members or workers who pay no dues.

The net worth of the URWA, as of June, 1948, is $795,984, an increase of $197,984 over last year. The increase is due to the raise in dues per member from $1 to $1.50 a month.

The first news from the convention stated that Mr. Buckmaster's annual report in which he criticized the political maneuvering of other officials of the union and the refusal of the officials to repudiate Henry Wallace and support the Marshall Plan had been approved by a vote of 818 to 788.

Further reports stated that Mr. Buckmaster was reelected general president of the union by the very close vote of 810 to 808 over Mr. Bass. H. R. Lloyd, vice president and a Bass supporter, however, defeated the Buckmaster candidate, J. D. Childs, 811 to 807, and C. L. Lanning, secretary-treasurer, another Bass supporter, was also reelected. The composition of the executive board finally elected was 10 to 5 in favor of the Anti-Buckmaster forces.

When the convention finally ended the delegates voted unanimously in favor of (1) supporting the Democratic national platform, (2) repudiating Henry Wallace's Progressive party, and (3) supporting the European recovery program.

President Buckmaster said that he was happy to see the URWA taking a clear view on these important issues of the day. He declared that the CIO executive board accepted the Democratic platform because it carried in it pledges that will benefit labor, "especially the repeal of the Taft-Hartley law."

An amendment to the constitution to give local unions final authority to approve contracts instead of final approval by the international union's policy committee was defeated. Most of the local unions favored this policy, but were unable to muster the necessary two-thirds majority, it was reported.

It was also reported that the Communist party was assailed more at this convention than at any previous one. *Daily Worker* reporters were accused of misstatements in the party's newspaper.

Sun Rubber Strike Ends

The strike at the Barberton factory of Sun Rubber, which lasted four months, ended September 9 when company officials and representatives of the URWA signed a new contract.

The strike began on May 8 after Sun Rubber declined to grant a union shop. T. W. Smith, Jr., general manager of the company, stated at that time:

"We believe the American way of life includes the right of the individual to choose for himself whether or not he shall join the labor organization."

The company stood firm on this point throughout the long shutdown. Wage rates and other basic conditions were never in dispute—the company having offered an 11¢-an-hour increase prior to the strike.

The Sun plant is returning to full operating conditions as rapidly as possible, but the lost production will curtail to a great extent the company's shipments of orders for the Christmas season, it was said.

All workers will be taken back by the company without prejudice, and Mr. Smith reports Sunruco is planning peak production for the remainder of 1948 and well into 1949.

Neither the company nor the union has revealed all the terms of the settlement, but it is understood that an 11¢-an-hour wage increase, six paid holidays, three weeks' vacation with pay for workers with 15 years or more service, and maintenance of membership are included.

The long strike cost the company $5,000,000 in business and the workers $2,000,000 in wages, according to Mr. Smith.

Pharis May Abandon Newark, O., Plant

According to a series of articles in the *Akron Beacon Journal* during September by Joseph E. Kuebler, management and the board of directors of Pharis Tire & Rubber have decided to suspend operations at their Newark, O., plant, where a strike has been in progress for four months. Stockholders of the company will be asked to approve this action at a meeting during September, it was said.

Founded 36 years ago, Pharis made money every year but one up to 1948. In the twelve months preceding the shutdown on May 1, however, Pharis lost more than a half-million dollars. With about $4,000,000 in current assets and $1,500,000 in current liabilities, the company is in a fairly good financial condition, in spite of its recent difficulties.

It is understood that management of the company is interested in going into other lines of business more profitable than the tire business ever was. Stockholders will be asked to approve this move also, but since the management-labor relations at Newark do not seem capable of improvement, any new operations of the company are likely to be at some other location.

When the Pharis company could no longer enjoy a unit tire manufacturing cost lower than its major competitors, it lost its chief advantage in producing a tire that could be sold for less. Management's

suggestion that URWA local union accept a reduction in the hourly pay rate and work more hours per week was rejected by the local union and particularly by the international union since this acceptance would have weakened its position in bargaining with other employers. With a choice between operating at a loss or liquidation of the Newark plant, the latter course was the obvious one to be followed.

CALENDAR

Oct. 12-14.	National Chemical Exposition and National Industrial Chemical Conference. Coliseum, Chicago, Ill.
Oct. 13.	Newark Section, SPE. Newark Athletic Club, Newark, N. J.
Oct. 13.	Rhode Island & Southeastern Massachusetts Section, SPE. Providence Engineering Society Bldg., Providence, R. I.
Oct. 14.	Central Ohio Section, SPE. General Electric Plant, Coshocton, O.
Oct. 15.	Akron Rubber Group. Mayflower Hotel, Akron, O.
Oct. 15.	New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
Oct. 18-22.	National Safety Council. 36th National Safety Congress & Exposition. Chicago, Ill.
Oct. 19.	Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
Oct. 19.	Rochester Section, SPE.
Oct. 20.	South Texas Section, SPE. Ben Milam Hotel, Houston, Tex.
Oct. 28.	Northern California Rubber Group.
Oct. 29.	Cleveland Section, SPE.
Nov. 3-5.	American Society of Body Engineers, Inc. Annual Convention. Rackham Memorial Bldg., Detroit, Mich.
Nov. 8-10.	Division of Rubber Chemistry, A. C. S. Book Cadillac Hotel, Detroit, Mich.
Nov. 9.	Washington Rubber Group.
Nov. 9.	New York Section, SPE. Hotel Sheraton, New York, N. Y.
Nov. 9.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Nov. 10.	Newark Section, SPE. Newark Athletic Club, Newark, N. J.
Nov. 10.	Rhode Island & Southeastern Massachusetts Section, SPE. Providence Engineering Society Bldg., Providence, R. I.
Nov. 16.	Rochester Section, SPE.
Nov. 18.	Rhode Island Rubber Club. Crown Hotel, Providence, R. I.
Nov. 18.	Northern California Rubber Group.
Nov. 26	Cleveland Section, SPE.
Nov. 28-Dec. 3.	ASME. Annual Meeting. Hotels New Yorker and Pennsylvania, New York, N. Y.
Nov. 29-Dec. 4.	18th National Exposition of Power & Mechanical Engineering. Grand Central Palace, New York, N. Y.
Dec. 3.	Philadelphia Rubber Group.
Dec. 7.	The Los Angeles Rubber Group, Inc.
Dec. 10.	New York Rubber Group. Christmas Party. Henry Hudson Hotel, New York, N. Y.
Dec. 10.	Detroit Rubber & Plastics Group, Inc. Christmas Party, Detroit Leland Hotel, Detroit, Mich.
Dec. 10.	Southern Ohio Rubber Group. Dinner-Dance. Miami Valley Country Club, Dayton, O.

EAST

Appoints Export Manager

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed Carl F. ter Weele export manager, with headquarters at the company's New York, N. Y., office, 3700 Chrysler Bldg.

Mr. ter Weele is of Dutch descent and received his education in the Netherlands, France, England, and Germany, specializing in economics, foreign trade, and languages. His first business association was in the Dutch East Indies, where he was assistant to the administrator of a tea plantation and also assistant fabrication chief in a tea factory. After his return to Europe, Mr. ter Weele was made president of Croca Co., Bruxelles, Belgium, and later became associated with the export sales division of Philips-Eindhover, the Netherlands. He saw active service as an officer in the Royal Netherlands Army during the invasion in 1940. After his discharge from the army Mr. ter Weele became connected with Remington Rand, Inc., as an export division executive.

Carl F. ter Weele

Technical Director

John W. Snyder, who was recently appointed technical director of Binney & Smith Co., 41 E. 42nd St., New York 17, N. Y., has been with the company since June 15, 1927. After his first position as chemist he was made research manager and then assistant technical director.

Born in Garwood, N. J., October 2, 1905, Mr. Snyder attended elementary school in Garwood, high school in Westfield, N. J., and Cornell University, from which he was graduated, just prior to joining Binney & Smith, as a bachelor of chemistry.

He is also author of several papers, including those on all phases of carbons, their range, compounding and processing, testing, and control of production

Besides devoting time to his hobby, which is golf, Mr. Snyder is a member of the American Chemical Society, Sigma Xi, Tau Beta Pi, the Chemist Club, the Cornell Club of New York, and the Echo Lake Country Club.

Mr. Snyder is married and the father of three children. The Snyder residence is on Lambert Mills Rd., Scotch Plains, N. J.

John W. Snyder

Merger Consummated

The Resinous Products & Chemical Co., Washington Sq., Philadelphia 5, Pa., has been merged into Rohm & Haas Co., a Delaware corporation, with which it has been closely affiliated ever since Resinous Products was founded in 1926. Effective immediately, Rohm & Haas Co. will carry on all the activities formerly conducted by The Resinous Products & Chemical Co. without change in policy or personnel. The products heretofore sold under the latter name will in the future be sold by The Resinous Products Division of Rohm & Haas Co.

The following officers were named to the new set-up: president, Otto Haas; executive vice president, Duncan Merriwether; vice presidents, C. E. Andrews, A. L. Blount, R. A. Connor, L. W. Covert, D. S. Frederick, E. L. Helwig, L. Klein; secretary, S. C. Kelton; treasurer, W. T. McClintock, assistant secretaries, J. F. Bergin, P. J. Clarke, Wm. Kohler; assistant treasurers, T. V. Monahan, George Schnabel. The directors of the company are: Mr. Haas, chairman; E. C. B. Kirsopp, vice chairman; Wm. W. Bodine, W. J. Friedman, F. O. and John C. Haas, and Messrs. Connor, Covert, Frederick, Kelton, Klein, and Merriwether.

Since its organization, Resinous Products pioneered in the development and manufacture of synthetic resins for the coatings, plywood, paper, and other industries. It is one of the leading producers in this field; its resins are distributed thoughout the world under a number of trade names including: Amberol, Uformite, Aquaplex, Duraplex, Paraplex, and Amberlite.

The business of Rohm & Haas was started in Philadelphia in 1909 to manufacture and sell Oropon, the original enzyme bate, and other products important to the leather industry. World War I brought the company into prominence as a supplier of industrial chemicals. Of its present list of products for the leather, textile, insecticide, plastics, and other industries, the best known is probably Plexiglas, the acrylic plastic.

Plants are operated at Philadelphia, Bristol, Pa., Knoxville, Tenn., and Houston, Tex.

Marshall Studio

George C. Sheldon

General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass., has appointed George C. Sheldon sales manager. He was formerly employed by Union Bay State Chemical Co. and also by General Tire Co. in the same capacity. Mr. Sheldon attended Bates College and the Harvard Graduate School of Business Administration. He is also very active in civic affairs in Lexington, Mass., where he lives with his wife and three children.

New Hewitt Items

Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo 5, N. Y., has announced a new high-tension fabric conveyer belt, called Raynile, for jobs where belt tensions run as high as 1,000 pounds per inch of width. According to J. H. Hayden, vice president in charge of sales, the belt is made of a combination of rayon and nylon. Important features of the new belt include maximum tensions almost double that of 48-ounce cotton fabric; excellent transverse flexibility; minimum stretch in actual operation; and easy field splicing. The belt consists of plies of rayon and nylon fabric suitably bonded to each other, with the top cover bonded to the carcass by shock absorbing cord breaker.

The new Yard'n Gard'n rubber hose for the retail household products trade was also announced by Hewitt. The carcass of the new hose is made of strong braided cord and provides ample resistance to pressure and crushing, being hard to kink, but easy to coil. It is available in two types: the double-braided Seneca type; and the single-braided Oriole type. The hose cover is of weather resistant rubber said to withstand cutting and abrasion. The hose is equipped with full-flow couplings and will be available in red, green, or black. Both types of hose will be supplied in ½-, ⅝-, and ¾-inch sizes; in coupled lengths of 25 and 50 feet; and in 500-foot bales.

Conveyors for Coal

On the occasion of his eightieth birthday on September 1, Thomas Robins, Sr., inventor of the modern belt conveyer and chairman of Hewitt-Robins, said that the coal mining industry will need to mechanize completely its operations within the next 10 years in order to hold its present markets. The coal industry faces the challenge of a desperate need of more production in the light of increased costs and growing competition from other fuels, Mr. Robins said. The belt conveyer is helping increase production and the coal mining industry is conveyerizing operations at a rapid pace. As an example, Mr. Robins cited the New Kathleen Mine, in DuQuoin, Ill., which has just been completely conveyerized and is producing 32 tons of coal a man a day, more than three times the average production in the domestic coal industry. Mr. Robins also predicted that the iron ore industry would be the next major industry to be conveyerized. Declining quality of iron ore in the Mesabi Range is forcing producers to establish "beneficiating" plants at the sites of the mines to improve ore quality. This policy will necessitate a whole new approach to the problem of handling iron ore and will be largely solved by the belt conveyer, Mr. Robins declared.

J. J. Murray, who has served in various export capacities with Hewitt-Robins during the past 28 years, has been appointed to the newly created position of export manager for the corporation. Mr. Murray has for some years supervised export activities of the Hewitt Rubber division, but only recently assumed direction of export activities for the Robins Conveyors and Restfoam divisions.

Mr. Murray recently left for Europe where he will study private and government needs for material handling equipment and mechanical rubber goods. Later he will go to the Middle East, where expanding petroleum production has increased requirements for many types of Hewitt hose. Upon his return, Mr. Murray will maintain his headquarters at the New York, N. Y., executive offices of Hewitt-Robins, Inc., at 370 Lexington Ave.

Premiums Show

The Annual Premium & Advertising Specialties Exposition was held in the 71st Regiment Armory, New York, N. Y., from September 20 to 24. The show, which is sanctioned by the Premium Advertising Association of America, Inc., and the New York Premium Club, showed items produced by more than 220 manufacturers in about 180 exhibits. Many of these items were of rubber or plastic.

Among the exhibitors were Bayshore Industries, Inc., Elkton, Md., featuring balloons, toys, joker thumbs, squawker dolls, play balls, and custom-made rubber and plastic cloth items; the Oak Rubber Co., Ravenna, O., showing toy balloons, Squeeze-me toys, and novelties; National Carbon Co., Inc., New York, exhibiting "Krene" plastic products; Plymouth Rubber Co., Inc., Canton, Mass., featuring Vinyl products including aprons, tablecloths, raincoats, etc.; A. Harold Mills, New York, showing molded plastic wares and household rubber products.

Additional exhibitors featuring rubber and plastic products were the Jericho Toy Mfg. Corp., Ben S. Loeb, Inc., Tek Hughes, Inc., Du Boff & Co., S. White & Co., Inc., Rosenberg Bros. & Co., Alfred Alterman, Blossom Mfg. Co., Allura Products, Inc., all of New York, N. Y.; Nosco Plastics, Erie, Pa.; Commonwealth Plastics Corp., Leominster, Mass.; Mack Holding Co., Wayne, N. J.; F & F Mold & Die Works, Dayton, O.; E. H. Ferree Co., Lockport, N. Y.; Ballard Advertising Novelties, Keyport, N. J.; and the Process Co. of America, New Rochelle, N. Y.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced the small-scale manufacture of titanium metal as a new basic raw material for industrial development. A pilot unit of 100 pounds' daily capacity was placed in operation at the Newport, Del., plant of the company's pigments department. Although plentiful in nature, titanium metal is very difficult to separate in pure form from its ores and is therefore almost unknown as an industrial material. The United States Bureau of Mines has been producing the metal for research purposes, and the du Pont unit is said to be the first for the production of ductile titanium metal for commercial exploration.

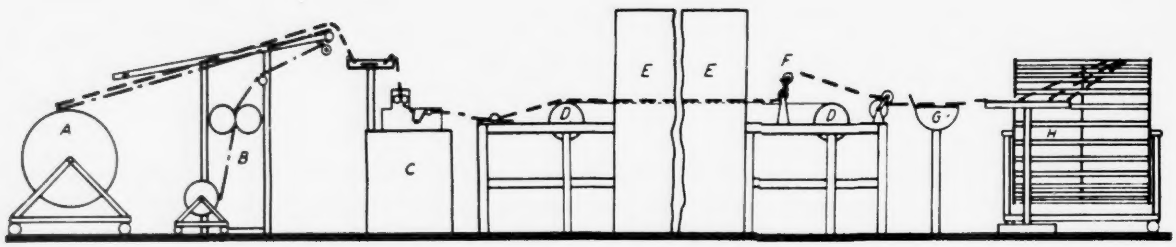
Sindar Corp., 330 W. 42nd St., New York 18, N. Y., through Sales Manager R. E. Horsey, has announced the addition to its sales staff of R. J. McKeefery, who will handle the sale of industrial aromatics, antiseptics, germicides, mildewcides, preservatives, stabilizers, and other products in New York State, New Jersey, Connecticut, Rhode Island, and Vermont. Mr. McKeefery has been with Sindar and its associate company, Givaudan-Delawanna, Inc., since August 1946. He was engaged formerly in the technical sales service.

MacCracken Made Vice President

Alan L. MacCracken, purchasing agent of Ohio Rubber Co., Willoughby, O., since 1944 and with Goodyear Tire & Rubber Co. for 18 years preceding that date, has been named vice president of E. P. Lambert Co., rubber broker and sales representative with headquarters in Akron, O. Mr. MacCracken's activities will be in sales for the Lambert company, which handles an extensive line of crude rubber, liquid latex, and latex compounds as well as coal-tar chemicals.

Mr. MacCracken is a graduate of Lafayette College and Cleveland Law School and is a member of the Ohio Bar. During his years with Goodyear he held many positions in design and development work. In the late 20's he was active in Goodyear's aeronautical program, both as an airship designer and as a pilot of blimps and free balloons. During the war years he was manager of war materials purchasing for Goodyear.

Alan L. MacCracken



Flow Chart for Andal Cut Rubber Thread Process: (*A*) Calendered Unvulcanized Rubber Stock on Paper Liners; (*B*) Paper Liner Rewind; (*C*) Andal Cutter; (*D*) Conveyer Main Pulleys; (*E*) Curing Oven; (*F*) Thread Take-off; (*G*) Thread Dusting Unit; and (*H*) Drum Wind

Rubber Thread Process

The Andrews-Alderfer Processing Co., Inc., Akron, O., has revealed particulars on its newly developed and patented Andal process for producing cut rubber thread. In this process calendered rubber sheet is cut before vulcanization, thus permitting cutting waste to be remilled and salvaged. Vulcanization after cutting gives a cured surface to all four sides of the thread, improves toughness, and insures a smooth finish. The thread production process is automatic from the cutter through the curing oven and on to the drums, and labor cost per unit of production is therefore very low.

The accompanying flow chart of the process does not show mills or calender. A small, inexpensive, four-roll 8x16 calender unit which produces a nine-inch wide sheet is used in the company's pilot plant. Ordinary craft paper liners, which can be reused several times, are employed, and the finished thread is free from liner marks. Long lengths of thread are produced, an obvious advantage to thread processors. The calendered sheet on paper liners is taken off in rolls having 500 or more yards per roll, and the rolls are joined to give continuous cutting.

The paper and unvulcanized sheet are separated ahead of the cutter and the paper rewound (*B*). The rubber is fed through a lubricating solution into the Andal cutter (*C*) whose meshed multiple disks cut the sheet into 180-260 ends or threads. These cut threads feed on to a specially constructed conveyer belt (*D*) which employs a glass fiber base to resist the high temperatures sustained. In the pilot-plant oven circulated hot air from gas heaters is used, but other installations under construction will use steam heat. At the other end of the oven (*E*) the thread is stripped (*F*) from the belt, fed through a dusting mechanism (*G*), and rolled onto drums or skeiners (*H*) before chaining to permit final inspection by the operator.

Andal production units with annual capacities as low as 50,000 pounds of finished thread are being engineered, as compared with conventional cut rubber thread plants of minimum effective size which represent large investments and have production capacities exceeding market potentials. The company has already granted franchises in Canada, England, and India, and other foreign franchise arrangements are being negotiated.

Wooster Rubber Co., Wooster, O., by means of improved production and material handling equipment and techniques, has been able to hold the prices of its Rubbermaid housewares to 1942 levels despite current labor and materials costs of 220% and 50%, respectively, above those of 1942. Plant-wide mechanization is one major factor in keeping the prices down, according to J. R. Caldwell, company president. A new price list, effective August 1, showed price increases for less than 20% of the entire Rubbermaid line, although many of the items are selling at below-1942 prices. In addition to holding the price line, the company has also improved quality of product by use of special rubbers. Production improvements include a new cutting machine for feeding uncured stock to the molds, and a modernized mold room expanded in size and laid out to make efficient use of new conveyer systems. Throughout the plant, changes in layout have been made to tie in with the conveyerized movement of materials and semi-finished products and to make efficient use of available floor area. Plant engineers estimate that Wooster is now using close to 100% of plant area, as compared with the probable average of 50-60% attained in many manufacturing plants.

Pennsylvania Rubber Co., Jeannette, Pa., has announced a two-year hazard guarantee on all farm service tires as a result of dealer acclaim of the company's unconditional road hazard guarantee on passenger and truck tires. The new guarantee is an innovation in the dealer-distributer tire business, according to R. B. Cave, vice president in charge of sales, who said that the hazards to which farm service tires are exposed ordinarily make it impossible to give such a warranty on the average tire. Under the guarantee, farm tractor and implement tires are insured against all normal field and road hazards for a period of two years. Tires failing under the terms of the new warranty will be replaced by on-the-spot dealer adjustments.

Mr. Cave also announced appointment of Gordon V. Millichamp as manager of the company's New York sales branch. Previously Mr. Millichamp had served as vice president and sales manager of the Automotive Supply Co., Altoona, Pa., and had spent 12½ years prior to that with the Firestone Tire & Rubber Co.

Goodrich Expanding Operations

Rubber lining of storage tanks, tank cars, pipe lines, and other equipment is to be added to production activities at the Tuscaloosa, Ala., plant of The B. F. Goodrich Co., Akron, O. Erection of the building to house this activity will begin at once; the structure will be near the company's tire and tube plant and will contain about 7,200 square feet of floor space. Most of the rubber lining work will be done at the Tuscaloosa plant, but some of the larger jobs require Goodrich personnel to do the lining "on location."

McKenna, Grant Advanced

Two key appointments within the sales organization of Diamond Alkali Co., Union Commerce Bldg., Cleveland 14, O., were announced September 1 by Fred W. Fraley, sales vice president.

J. C. McKenna, for the past six months product manager of chromium chemical sales, has been named product manager of alkali sales, to succeed J. D. Mattern, who retired in mid-August after 25 years with the company.

Mr. McKenna's successor is Charles E. Grant, assistant to the president of the Martin Dennis Co., Newark, N. J., since this manufacturer of chromium chemicals was acquired by Diamond earlier this year.

Both Mr. McKenna and Mr. Grant assume their new duties at the company's general headquarters in Cleveland.

In his new post Mr. McKenna will shoulder with Director of Sales W. H. McConnell the increasing responsibility of marketing Diamond's greatly expanded output of alkali chemicals, Mr. Fraley said. One of the largest alkali producers in the nation, Diamond Alkali since 1938 has stepped up soda ash production by approximately 45%.

Recent completion of a $14,500,000 electrolytic caustic soda-chlorine plant at Houston, Tex., added to the extensive expansion and modernization of production facilities at Painesville, O., Edgewood, Md., and Pine Bluff, Ark., have multiplied the company's total output of caustic soda to a figure more than three times the volume of that product made in 1938 at the Diamond plant in Painesville.

Standard Machinery Co., Mystic, Conn., is producing a new line of extruding machines for the wire and cable, rubber, and plastics industries. The line will include strainers and a complete series of accessories. Ben Davis, formerly with John Royle & Sons and later eastern representative of the McNeil Machine & Engineering Co. and Hartig Engine & Machine Co., has been appointed sales manager in charge of sales and distribution of the extruding machines. Edmond Spencer, previously with American Locomotive Co., Commonwealth Steel Corp., and Electric Boat Co., has also joined the staff of Standard Machinery as mechanical designer. In its one hundred and first year of operation, Standard Machinery originally built many of the reciprocating steam engines and boilers used in early steam-powered vessels. Other products made through the years have been cotton gins and bookbinders' machinery, and the company currently produces the Stokes-Standard hydraulic toggle-type molding press. The company is well equipped for the manufacture of extruding machines and has adequate facilities for expansion.

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Goodrich Chemical Co., 324 Rose Bldg., Cleveland, O., is making Lactoprene EV, a modified polyacrylic ester. This material is an experimental product developed by the Eastern Regional Research Laboratories of the United States Department of Agriculture. To be redesignated as Polyacrylic Ester EV, it will complement other nitrile and polyacrylic ester-type rubbers now being manufactured by the company. At present the new ester is available only in pilot-plant quantities.

A new technique in manufacturing men's shirts has come with the introduction of the Press-Fuse collar lining, made by a subsidiary of J. P. Frank & Co., Inc., New York, N. Y. This collar lining material is calendered plastic film made from a special formulation of Geon polyvinyl chloride resin, a Goodrich Chemical product, and it is claimed, it will prevent shrinkage and minimize wrinkling of shirt collars. Sold in rolls to shirt manufacturers, the lining is die cut to shirt collar shape, placed between two layers of cloth fabric, and then fused to the cloth layers by 65-75 pounds of steam pressure and 75-85 p.s.i. of plate pressure. After fusion there is no possible way for the cloth to shrink since the liner holds it to original collar dimensions. One yard of collar lining will serve for two dozen shirts and is said to save shirt manufacturers from 10 to 15¢ per dozen shirts.

Erie Foundry Co., Erie, Pa., recently held its annual stockholders' and directors' meeting at which the president reported that the company had had another successful year. A slight change was made among the company officers, resulting in the following selection: D. A. Currie, reelected president and treasurer; F. F. Clark, honorary vice president; James A. Currie, first vice president; Robert N. Yates, second vice president; C. D. Pinney, secretary.

Herron Bros. & Meyer, Inc., recently moved its New York offices from 82 Beaver St. to the Empire State Bldg., 350 Fifth Ave., New York 1, N. Y.

The Faultless Rubber Co., Ashland, O., on September 24 held its annual stockholder's meeting at which all directors were reelected. Then the board convened to elect the following officers: chairman and president, Wallace De Laney; first vice president, T. W. Miller, Jr.; secretary-treasurer, George A. Meiler; assistant treasurer, Z. T. Wile; assistant secretary, R. C. Johnson.

Dayton Rubber Co., Dayton, O., was judged as having the best 1947 annual report of the rubber and tire industry in the final ratings of an independent board of judges for the *Financial World* Annual Report Survey. A. L. Freedlander, company president, will receive the bronze "Oscar of Industry" trophy at the annual awards banquet on October 21 at the Hotel Pennsylvania, New York, N. Y. More than 4,000 corporation annual reports were submitted in this national survey, eighth in the series, and were judged in 100 industrial classifications for "Best of Industry" awards. In the rubber and tire category the Goodyear Tire & Rubber Co., was runner-up for top honors, and Seiberling Rubber Co., both of Akron, O., took third place. Reports were rated on the basis of content, format, and typography.

Broadening Its Activities

United States Rubber Co., Rockefeller Center, New York 20, N. Y., through its textile division has announced production of new cotton and rayon fabrics for men's and women's apparel. This production marks the entrance of the company into the apparel cloth field, although initial output will be in limited quantities. Color-fast ginghams of combed cotton yarn will be introduced in box loom patterns for women's and junior misses' dresses in the form of high style checks and plaids. The new line will also include rayon suitings in stripes and box patterns for both men's and women's suits and coats. The fabrics are being woven by the company's Seaboard Mills, Burlington, N. C., which also produces drapery fabrics and plastic fabrics for auto seat covers.

Construction of a new building in Atlanta, Ga., for U. S. Rubber is now well under way. To house both offices and warehouse, the building is expected to be ready for occupancy about mid-November. Located at Lee and Donnelly Sts., the new building will be one of the most modern and well equipped of its kind anywhere, according to L. M. Moulson, branch operating manager. The structure will be one story high, with approximately 100,000 square feet of floor space, and be one of the major stocking points in the country for the company's rubber products. Growth of the company's business in the Atlanta area necessitated the move from the branch's present location at 204 Walker St., S.W., Mr. Moulson explained. The branch will employ some 140 persons, including office workers and warehouse personnel. It will have excellent facilities for materials handling and stocking, with a loading platform capable of handling five freight cars and six interstate "land cruiser" type of trucks at one time.

Expansion of the Atlanta branch is part of the company's program to extend its operations throughout the South, Mr. Moulson said, pointing out that the company now operates six southern textile mills: the Stark & Reid Mills at Hogansville, Ga.; the Shelbyville Miss at Shelbyville, Tenn.; the Winnsboro Mills at Winnsboro, S. C.; the Gastonia Mill at Gastonia, N. C.; the Seaboard Mills; and the Scottsville Mill at Scottsville, Va. The company also operates a footwear plant at Milan, Tenn., and a Lastex yarn plant at Burlington. Last year U. S. Rubber purchased nearly $35 million worth of southern cotton for conversion into fabrics used in the 30,000 rubber products it manufactures, with approximately one pound of textile material used in every three pounds of manufactured rubber articles.

Changes in Personnel

C. E. Gotshall has been appointed merchandise manager of Gillette tires division. With Gillette since 1940, his most recent post was Gillette district manager at Chicago.

L. E. Luse has been made manager of sales operations for Gillette. He joined U. S. Rubber in 1923 at New York and progressed through various sales and managerial positions, including that of manager of planning and business development.

Leo Sklarz, Jr., has been named advertising and sales promotion manager for the Gillette division. He came to the rubber company in 1945 as a member of the sales promotion department and has had wide experience in the advertising and publishing field.

M. George Burnett, former factory manager of the Providence plant, has retired after 29 years of service. Born and educated in Boston, Mass., Mr. Burnett came to U. S. Rubber in 1919 and for 15 years was assistant comptroller of the company and control manager of its footwear division in Naugatuck, Conn. In 1936 he became factory manager of the Providence, R. I., plant, where he remained more than 11 years. Recently Mr. Burnett acted as a consultant on the staff of Ernest G. Brown, vice president and general manager of the mechanical goods, general products, Lastex yarn and rubber thread divisions.

Officials and employes of the Providence plant gave a farewell dinner in honor of Mr. Burnett on September 9.

After 25 years' continuous service with U. S. Rubber, Harry G. Warren, Atlanta district manager of the firm's mechanical rubber goods division, retired as of September 17.

New Product Developments

An electric heater for refrigerators is being made by U. S. Rubber. The heater is a strip of electrically conductive rubber which warms up to about 115° F. and prevents moisture from condensing on certain parts of the refrigerator. The strip is placed between the freezing compartment and the regular cold chamber. The heat keeps the dividing member free of moisture without materially affecting the temperature of the refrigerator. Use of the heating element was explained by R. D. Gartrell, development manager of the company's Passaic, N. J., plant who said that it will prevent continued moisture from condensing on and deteriorating the enamel of the refrigerator.

Ramie, one of the world's oldest vegetable fibers, is now being produced as packing for reciprocating pumps by U. S. Rubber. Ramie packing is recommended for such uses as cold water and brine pumps because its high tensile strength and ability to absorb and retain lubricants reduce abrasion and prolong wear. Its toughness makes it suitable for packing applications where service requirements are too severe for flax or jute fibers. The company is marketing the square plaited ramie packing in coil form in sizes of ¼-inch thickness and larger.

Fourteen miles of rubber stair treads covering more than 20,000 individual steps have been installed in Herman Gardens, Detroit, Mich., world's largest two-story housing project, to cut down noise and increase safety for its 9,000 residents. The new treads, made of specially compounded rubber, were developed by U. S. Rubber at the request of the Detroit Housing Commission. The rubber is bonded to the steel steps with a specially developed cement. The treads have a protective reinforced rounded nozing which overlaps the lip of the stair tread for added safety.

U. S. Rubber has been awarded a contract to supply 12 miles of conveyer belt for the hundred million-dollar Hungry Horse Dam, to be constructed across Flathead River near Devil's Elbow, Mont., under the supervision of the United States Bureau of Reclamation. The belt will transport approximately 5,600,000 tons of sand and gravel to the dam site from gravel deposits located five miles away. Ten sections of belting, each one mile in length, will be used for the main conveyer lines. The majority of the belting will be 30 inches wide. Approximately two miles of belts in miscellaneous sizes will also be used on the project. Installation of the conveyer system is expected to be completed by next summer.

Wintrac, a new type tire tread containing ordinary rock salt and said to give as much as 30% better traction on ice-covered slippery roads than conventional treads, has been announced by U. S. Rubber. Intended for recapping worn tires for safer winter driving, the tread consists of a high-quality tread stock into which thousands of pieces of rock salt have been mixed. As the tread wears down, the pieces of salt are released to form surface pores which grip the slightest road irregularity. Tests conducted on clear lake ice showed that the new recap tread stops cars up to 30% quicker than do ordinary new tires with conventional treads. The new tread also improves traction by reducing wheel spin on ice and snow-covered surfaces. While Wintrac is not designated to replace chains for winter driving, its performance on smooth, slippery roads reduces the delay and expense of frequent mounting and dismounting of chains for short distances.

Laytex RUW, a new electrical wire with rubber insulation that improves when soaked in water, has been developed by U. S. Rubber for wiring homes, offices, factories, and other buildings. The new wire is designed for use underground and in wet locations where its high moisture resistance gives longer life and increased safety. It is particularly suitable for underground lead-ins and wiring damp basements. Secret of the wire's durability is a coating of high-purity natural rubber latex applied by the dip process. Tests conducted by Underwriters' Laboratories, where the wire was immersed into water at 122° F. for 24 weeks, showed an insulation resistance curve that rose from 500 to 2,400 megohms per 1,000 feet of wire. A normal insulation resistance curve shows a sharp drop after two to four weeks' immersion.

Cincinnati Industries, Inc., Cincinnati, (Lockland), O., has developed a means of alleviating the current serious shortage of steel drums. The company is producing disposable X-Crepe drum liners to solve the problem for shippers of materials in open-head returnable-type drums. Advantages of the drum liners include savings in costs of cleaning and coating drums, savings in time because drums are reusable immediately upon being emptied, reduction in drum inventory investment, prolongation of drum life, and higher drum resale value upon disposal. Materials now shipped and stored in drums protected by X-Crepe drum liners include aqueous dispersions and emulsions of latex, and aqueous dispersion-type adhesives. Development work under way is expected to result in the use of the drum liners for shipping and storing asphaltic products, petrolatums, resins, chemicals, paints, waxes, food products, oils, and other materials.

Sun Chemical Corp., Long Island City, N. Y., has started construction on its new plant in Wood River Junction, R. I., which will house the Warwick Chemical Division of the corporation, consolidating the facilities of the plant in West Warwick, R. I. and the present plant in Wood River Junction. Warwick Chemical manufactures textile chemicals, including the well-known water repellents Norane and Impregnole, as well as metallic stearates, organic chemicals and waxes.

It is expected that the new plant facilities will be in operation early next year.

Foamex Plant to Be Doubled

A million-dollar expansion program that will more than double the output of foamed latex at the Fall River, Mass., plant of The Firestone Tire & Rubber Co., Akron, O., was announced last month by Harvey S. Firestone, Jr., company chairman. The new program, involving construction of new buildings and installation of a substantial amount of new equipment, will result in the hiring of 600 to 700 additional plant workers, Mr. Firestone stated. Currently, the Fall River plant employs about 2,800 men and women for all its manufacturing operations.

"Rapidly increasing demands for Firestone Foamex have made this expansion essential," Mr. Firestone said. "This is the second time in two years that our productive capacity has been materially increased. In 1947, it was doubled by installation of new plant units.

"In the automotive industry, foamed latex has been used for seat cushions in the last couple of years in the high priced and medium priced cars. In the next year it will be used in practically all cars. In addition Foamex has been adopted by many furniture and public seating manufacturers for cushioning and upholstering, due to its proven superiority in softness, durability and lightness. Many new uses for foamed latex also have been developed in recent months. We can anticipate an ever broadening market for this product as people become more and more aware of its advantages."

Included in the new equipment already installed at the plant are many electronic curing and drying units, designed to improve further the quality of Foamex products and to reduce processing time.

New Division for Xylos

In order to provide better service and technical assistance in connection with the distribution of natural and synthetic latices and compounded adhesives, a new Firestone division of Xylos Rubber Co. was announced last month by C. R. Shaffer, Xylos president.

This new division will take over the activities formerly handled by Firestone Industrial Products and will provide sales service and technical assistance on natural rubber latices and compounds, GR-S latices and compounds, Butaprene latices and compounds, reclaim dispersions, and Butyl rubber dispersions.

W. F. Jordan will head the new division as manager of latex sales and will be assisted by J. P. Seguin and W. W. Madden in the eastern territory and by J. E. Beyer and C. E. Cain in the western district.

Recent Developments

In a large-scale experimental project, thousands of square yards of a newly developed Firestone Velon plastic screening cloth have been raised over plantings of shade-grown tobacco near Hartford, Conn. Experimental application of the open-mesh plastic cloth indicates repeated use of the material for a number of years, in contrast to the conventional practice of annually discarding the fabric shade material generally used. Early tests also indicate the Velon cloth to provide greater diffusion of light, permit higher moisture retention, and give greater protection against frosts. The experiment involving the use of 31,000 square yards of Velon cloth is being carried out by members of the National Shade Tobacco Growers Association in cooperation with the Connecticut State Department of Agriculture.

The development and production of a new leakproof tube for military and commercial aircraft was announced by Firestone. Called the Firestone Sky Champion Leakproof Tube, the new tube is said to hold air four times longer than ordinary tubes and thus give reduced tire and maintenance costs, virtually eliminate dangers of landing and taxiing on tires that have lost air pressure, and give increased safety and reliability. Secret of the tube is chemical treatment of the inside surface without increase in weight. Utilizing special equipment and manufacturing processes, the company treats each tube with a chemical to counteract normal seepage of air through the wall of the tube.

Goodyear's Golden Jubilee

Goodyear Tire & Rubber Co., Akron, O., celebrates its fiftieth anniversary with with a three-day program in Akron starting October 6, it was announced by P. W. Litchfield, chairman of the board. Some 1,700 key executives of the company, several hundred of whom are being called home from all parts of the world, will participate in the program which will feature dramatic reviews, an epic motion picture depicting the story of American opportunity, business sessions, addresses by top Goodyear officials, and a banquet in the company's gymnasium. On one day of the program the 450,000,000th pneumatic tire will be produced in one of the Akron plants. The Akron celebration will be the forerunner for anniversary dinners to be held in some 54 cities in this country where Goodyear has production or sales operations, and also in all foreign lands represented at the central gathering.

Mr. Litchfield pointed out that Goodyear's development, progress, and history has fitted into the evolving pattern of this nation's social, political, and economic progress, and the anniversary film, "A Letter from America," will portray the intertwining of free opportunity and enterprise into the American way of life. Production of the 450,000,000th tire marks another milestone in the company's history since it will introduce a new deluxe line of white sidewall Double-Eagle Super Cushion low-pressure nylon cord tires. Another feature of the celebration will be the production of tires using the 600,000,000th pound of synthetic rubber produced by the Goodyear Synthetic Rubber Corp. at Houston, Tex. Special tribute will also be paid to F. A. Seiberling who with his late brother, Charles W., founded the Goodyear organization. Also to be honored are the company's 50-year service veterans and 42 winners of the Paul W. & Florence B. Litchfield Award of Merit. The program will also include tours through the Goodyear research laboratory and plants and airship flights over the city.

Personnel Transferred

John J. Wyle has been made plant purchasing agent of Goodyear's factory at Topeka, Kan., to succeed C. W. Gilchrist, resigned. Prior to joining Goodyear in Akron in 1933, Mr. Wyle was purchasing agent seven years for Biggs Boiler Works. During the war he was on Goodyear Aircraft Corp.'s purchasing staff and early in 1947 became purchasing agent at the company's Wingfoot Homes plant in Washington Park, Ill. He returned to Akron recently as a senior buyer.

J. P. Connors, at present section head in the materials contact division of inter-

plant relations, has been named purchasing agent at the Goodyear plant in Buenos Aires, Argentina. Mr. Connors joined Goodyear there in 1933.

G. M. Wright, a member of the development department, will become production representative in Sahaganj, India, replacing W. L. Campbell, who will return to Akron for reassignment. Mr. Wright came to Goodyear in 1930.

New Products Announced

Goodyear has added a cork blanket to its line of newspaper press blankets. This new blanket is of uniform gage, impregnated with a special, oil-resisting compound designed to eliminate all swelling due to oils. Another improvement is the use of a low-stretch fabric so that the blanket will not "walk" on the press.

Another new Goodyear product is a stereotype-mat blanket. First in the company's line, it is designed primarily for direct-pressure newspaper mats. Composition is rubber and fabric, produced in the standard 26- by 30-inch size, one-eighth inch thick.

Goodyear is now also in production on its new "blue" newspaper printer roller, which, it is said, does not swell, retains its original hardness, and gives long service before and between regrinding. Its composition incorporates new materials made available since the war.

Production of a tough vinyl film with sunfast colors and the texture of velvet was announced by Goodyear's general products division. Designed for the fabricating trade, the new material is already being used in the production of high-quality wearing apparel, notions, and as a home decorating material. Increased use of the material in the manufacture of a wide variety of items is foreseen by C. P. Joslyn, general manager of the division. At present the material is being fabricated into rainwear, household aprons, nursery items, garment bags, shower curtains, draperies, and a host of miscellaneous articles. The film is produced in a wide range of translucent and opaque colors, permitting printing of patterns. Exhaustive tests for more than a year in Florida proved that the new vinyl film not only withstands the bright semi-tropical sun, but also the ocean salt spray.

Further improvements in Goodyear's Uni-Bond process for relining automobile brakes now make it possible for the company to offer dealers complete sets of Uni-Bond equipment incorporating several new features. The flexible band sets for bonding the brake linings to the brake shoes have been slotted to provide relief from the piercing action exerted by the heel of Lockheed hydraulic brake shoes (reducing band breakage)—a situation peculiar to that type of brake shoe design. The new flexible band sets are universal, as they may be used on all-type shoes, including those for nine- through 16-inch drum diameters.

Other improvement pertain to the special Goodyear-designed ovens, employed in the process for bonding under high temperatures. The new oven now has an improved type of refrigerator latch and is ventilated to permit positive locking. Appearance of the oven has also been improved so that it is attractively painted and contains the Goodyear design on the oven door.

Goodyear's sanitary hose is available again in a white, oil-resisting synthetic cover, especially compounded for long wear in abrasive usage. The white cover was discontinued during the war owing to a shortage of compounding materials. Extremely flexible and kink-resistant, the hose is recommended by R. W. Sanborn, manager of the hose department, for general washout or cleaning service in packing plants, creameries, dairies, canneries, and food processing plants. Mr. Sanborn said a superior sanitary hose, designed for heavy-duty operations, is manufactured in 25- and 50-foot lengths. A special creamery hose, in black cover, is available in continuous lengths up to 450 feet.

A portable rubber dock built by Goodyear was used to berth the Navy's flying boat, *Caroline Mars*, at Chicago recently after the plane ended its record 4,748-mile flight from Honolulu. Developed jointly by Goodyear and the Navy Bureau of Aeronautics, the inflatable dock comprises nine coated fabric pontoons decked over with marine grade plywood. When completely assembled, the pontoons are arranged to form an elongated "C" shape. Deck panels are hinged to provide necessary rigidity but are flexible enough to undulate with water movement. The completed unit, 25 feet wide across the bow and 103 feet long, can be erected in four to six hours by even an inexperienced crew.

Goodyear Aircraft Corp. has been awarded a contract by the Navy Bureau of Aeronautics for the engineering design of a type "X" non-rigid airship. The first postwar airship to be built in this country, the craft is the largest ever contracted for by the Navy and will have a helium capacity of 825,000 cubic feet, 100,000 cubic feet more than the last wartime type "M" ship. One of the most radical changes in design in the new airship will be the enclosure of the engines within the car. Two propellers, connected to the engines through a system of transmission shafts and gears, will be mounted on nacelles suspended from the car by means of single outriggers. Another radical change from normal blimp design will be the installation of tricycle landing gear with retractable wheels. Designed primarily for patrol operations, the new blimp will have an empty weight of approximately 34,000 pounds, an overall length of 324 feet, a width of 71 feet, and a height of 92 feet at the tallest point.

Goodyear's Pliofilm production equipment is running at peak capacity and supplying material for millions of packages of margarine each week, according to C. P. Joslyn, general manager of the general products division. He also stated that the company's newest film, MW Pliofilm, is being used by most of the nation's leading margarine producers in merchandising their product in the increasingly popular "squeeze-bag." MW Pliofilm is being marketed as a companion product to other types of Pliofilm which are rapidly expanding in volume use in the protective packaging of fresh, frozen, and dehydrated fruits, vegetables, meats, poultry, and seafood, as well as pharmaceuticals, tobaccos, and delicate mechanical instruments. Within the next 90 days additional Pliofilm production equipment, in installation stages for the past year, will be ready to operate, Mr. Joslyn said. This new equipment is being installed in facilities used during the war by the Goodyear Aircraft Corp.

The worlds' largest continuous production line for foamed rubber has been placed in operation by Goodyear at a new Akron plant. Turning out Airfoam cushioning for automotive seating and for the furniture and mattress industries, the new production line occupies facilities used during the war by Goodyear Aircraft Corp. E. J. Thomas, Goodyear president, said the operations represent an outlay of more than $5,000,000 in building and equipment. The new equipment, built to the company's engineering designs, consists of three parallel units. Two are in production exclusively for automotive seating; while the third unit is producing mattresses, mattress topper pads, molded Airfoam for furniture cushions, backs and arm rests, and miscellaneous items. In preparation for these expanded operations, Goodyear opened a new latex creaming plant last year at Rengam, Johore, in the Malayan Union. In Akron the latex is held in agitator-equipped storage tanks until needed in the production units. The latex is then carried from storage in glass-lined pipes to a series of mixing vats and other processing equipments where it is compounded before being given its final frothing and poured into the curing molds. After curing, the foamed rubber is washed and dried in huge ovens, then carried on long conveyer belts for compression tests, inspection, taping, and shipping.

A. G. Spalding & Bros., Inc., New York, N. Y., in celebration of the completion of the $2,500,000 addition at its Chicopee, Mass., plant, will hold open house on October 2 and 16.

WEST

Transfer Plastics Operation

Monsanto Chemical Co., St. Louis, Mo., has divided the industrial and surface coating resins sales department into two groups, according to James R. Turnbull, general manager of sales for the plastics division, Springfield, Mass.

One of the new sales groups, the adhesives and industrial resins department, will be headed by E. Everett Decker, formerly district manager at Lockport, N. Y. Assisting him will be Edmund S. Bauer, Jr., formerly assistant sales manager of the industrial and surface coatings resins sales department. The products of the department will include Resinox and Resimene resins, other than molding materials, and plywood adhesives, bonding resins and glues.

Albert W. Dunning will continue as sales manager of the surface coatings resins department, assisted by William C. Davis, formerly in the sales development department. Besides surface coating resins, the department will be responsible for the sale of styrene monomer produced at the company's rebuilt Texas City, Tex., plant, and for formaldehyde, soon to be produced at a new plant in Springfield.

The changes are the result of the transfer of the company's Lockport operation to Springfield, Mr. Turnbull explained.

Several other changes in the responsibilities of production department personnel also have resulted from this change from Lockport to Springfield.

Carl T. King, production manager, will continue in his present position and will be additionally responsible for the coordination of activities in the company's foreign plants and for special assignments.

The operation of the Springfield production department will be under Robert K.

Mueller, assistant production manager. The phenolic plant, including the production of formalin, Santodex, wood flour, and Resinox molding materials and resins, will be under Kenneth M. Irey, plant manager. The production of the continuous and sheet plant, including Saflex, Vuepak, Fibestos, Nitron, and butyral resins, will be handled by William T. Dickens, assistant plant manager. John C. Garrels, Jr., formerly plant manager at Lockport, becomes plant manager of the thermoplastic plant and will be responsible for the production of Lustron, Lustrex, Cerex, Ultron, Resimene, Resloom, and urea formaldehyde resins.

Thomas J. Diviney, director of industrial relations, will be responsible for coordination of office management activities.

Division engineering will be segregated into a divisional engineering department and the department of plant engineering and services. Both will be headed by Carl O. Hoyer.

Kenneth W. Short has been made acting purchasing agent for the plastics division, succeeding Glenn M. Bullard, who retired October 1.

Swift's Oil Processing Plant

Swift & Co., Chicago 9, Ill., through Vice President E. A. Moss, has announced that operations will begin this fall in its new industrial oil processing plant at Hammond, Ind., that will provide new sources of glycerides and fatty acids to the company's industrial oil production. The new plant, on part of a 70-acre tract, includes eight buildings and a tank farm and consists of units to carry out three processes: fat splitting, solvent fractionation, and solvent crystalization.

Fat splitting will be accomplished in a continuous hydrolysis unit constructed by the Blaw-Knox Co. which will produce mixed and fractionated fatty acids of high quality now in demand by manufacturers of rubber, plastics, resins, lubricating greases, inks, soaps, cosmetics, and other products. The solvent fractionation process will be conducted in a unit being built by the M. W. Kellogg Co. and employing its Solexol process. Solvent crystallization or destearination will be done in a unit also being constructed by Kellogg and will produce grease oils and stearines, red oil, stearic acid, and other fractionated fatty acid products.

Research into new and improved products and applications will be a vital part of the new operation and will be performed in an experimental pilot-plant. The company's present production of industrial oil is obtained almost entirely from glycerides of animal origin, but the new plant will also allow volume production of glycerides and fatty acids from vegetable and marine oils.

The Dow Chemical Co., Midland, Mich., recently named R. F. Boyer director of its physical research laboratory and W. C. Bauman assistant director.

Mr. Boyer joined Dow in 1935 in its student training course and following graduation became a regular member of the Dow staff. He has done considerable research on plastics and was especially active in studies on the light and heat stability and second-order transition effects in polystyrene and saran. For the past three years Mr. Boyer has acted as assistant to J. J. Grebe, former laboratory director.

Dr. Bauman came to Dow in 1938 on the physics laboratory staff and has worked on such projects as extraction of bromide from sea water, iodine from brine, magnesium from sea water, chlorination of organic compounds, and ion exchange resins.

PACIFIC COAST

Albert H. Federico

Hall Advances Federico

The C. P. Hall Co., Akron, O., has elected Albert H. Federico vice president of its subsidiary, The C. P. Hall Co. of California. Mr. Federico joined the California Hall company in January, 1946, as a sales representative.

He was born in Green Island, N. Y. This executive received his general education in Cleveland, O., schools and was graduated from Albion College with a B.A. degree. During 1940 and 1941, Mr. Federico was head football and baseball coach at Mendon High School, Mendon, Mich., where he also taught physics and mathematics.

In May, 1941, Mr. Federico enlisted in the Service and was called to active duty in October, 1941, with the U. S. Naval Reserve. He served in the South Pacific and was separated from the Service in February, 1946.

He is affiliated with The Los Angeles Rubber Group, Inc., and the Los Angeles Paint, Varnish & Production Club and is a member of Sigma Nu.

He and Mrs. Federico with their three-year-old son reside at Manhattan Beach, Calif.

International Fertilizer & Feed Co., Bakersfield, Calif., has purchased for $45,500, the guayule rubber mill in Bakersfield, built by the United States in 1945 at a cost of $362,168. The machinery and equipment of the mill had been previously sold by the government to Parkhurst & Seitz Machinery & Equipment Co., Oakland, for $21,000. The plant occupies a 31-acre site and includes mill and storage buildings, boiler house, office and laboratory, and warehouse. At its peak production in 1945 the mill had a daily capacity of 4,500 pounds of guayule.

W. J. Voit Rubber Corp., Los Angeles, Calif., recently celebrated its Silver Jubilee with an old-fashioned California barbecue at Elysian Park, Los Angeles, attended by company officials and about 300 workers.

OBITUARY

Thomas A. Desmond, Sr.

THE founder and president of T. A. Desmond & Co., Inc., crude rubber broker, 33 Rector St., New York 6, N. Y., Thomas A. Desmond, Sr., died September 19 at his Summit, N. J., home after a long illness. He was born in Brooklyn, N. Y., November 24, 1884.

After attending grade and high schools in Brooklyn, the deceased joined Robinson & Co. in 1901; he became a partner in the concern. It was in February, 1919, however, that he started T. A. Desmond & Co., Inc.

A member of the Commodity Exchange, Inc., Mr. Desmond was also a life member of the Elks and a member of the Downtown A. C.

Requiem Mass was sung at Church of St. Theresa on September 22, followed by burial at Gate of Heaven Cemetery, East Hanover, N. J.

Surviving Mr. Desmond are his wife, two sons, two grandchildren, and a brother.

Louis F. Marion

SUN RUBBER CO., Barberton O., has lost its assistant secretary-treasurer, Louis F. Marion. The 53-year-old executive, who had been with Sun since 1925 when he started as an auditor, succumbed to a heart attack on August 31.

Mr. Marion was Akron Commander of Knights Templar, a past president of the Chamber of Commerce and of the Barberton Shrine Club, a past commander of the Helen Thesing Post, American Legion, and a member of the Elks, Rotary Club, and Methodist Church.

Surviving Mr. Marion are his wife, a son, a daughter, three brothers, and two sisters.

Funeral services were held September 2 in Barberton, followed by burial at Greenlawn Cemetery.

Allan Rae

ALLAN RAE, Toronto branch manager of A. Schrader's Son Division, Scovill Mfg. Co., Brooklyn, N. Y., since his appointment in February of this year, died on August 28 as the result of a heart attack. Prior to his last position he had served for a decade as assistant Toronto branch manager.

For 13 years before coming to Schrader's Canadian organization in 1935, Mr. Rae

had been associated with the Dunlop Tire & Rubber Goods Co., Ltd., in its sales department. During that time he was assistant to the manager of car and truck manufacturers equipment sales.

Mr. Rae was a member of the Canadian Society of Automotive Engineers, Automotive Supplies Manufacturers Association, Automotive Parts Section, Canadian Manufacturers Association, and an honorary member of the Commercial Travellers Association of Canada.

He leaves a wife, a daughter, and a son.

Emil R. Gasser

DEATH came suddenly to Emil R. Gasser, 44, director of research of Farrel-Birmingham Co., Inc., September 5, at his home in Buffalo, N. Y.

Mr. Gasser was first employed by Farrel-Birmingham in 1928 and for the past three years directed the activities of the physics laboratory at the Buffalo plant. For his work in development of propulsion gearing and related design during World War II, Mr. Gasser was awarded a citation by the Navy Department.

Mr. Gasser was born and reared in Switzerland, and his death occurred only a week after his return from an extended visit to that country. He was educated in schools in Schaffhausen and Zurich, and he first came to the United States in 1925, to Buffalo.

Emil R. Gasser

He was a member of the Society of Automotive Engineers, the American Society of Naval Engineers, the Society of Naval Architects & Marine Engineers, the American Gear Manufacturers Association, and he also served on a special research committee of the Navy since the war's end.

Surviving Mr. Gasser are his wife, a son, his mother, a brother and a sister.

NEWS ABOUT PEOPLE

B. Brittain Wilson, general manager of India RUBBER WORLD and vice president of Bill Brothers Publishing Corp., publisher of this journal, on October 10 marks his fiftieth year with the organization. We on the staff of India RUBBER WORLD in extending our sincerest congratulations to "Britt" Wilson hope that he will still be here for his diamond jubilee and many more.

Harvey S. Firestone, Jr., will be the principal speaker at the American Trucking Association's convention, October 10, in Washington, D. C. "Truck Transportation and the American Way" will be the subject of his talk.

Mr. Firestone's father was the originator of the "Ship by Truck" campaign that swept the country after World War I and contributed greatly to the rapid increase in the use of motor cargo service.

John J. Freeman has been made technical director of The Neville Co., Pittsburgh, Pa. He received his B.S. degree at the Virginia Military Institute in 1935, followed by one year's graduate study at Johns Hopkins University, and then three years at the University of Munich. Before the war he worked for Calco Chemical, Bound Brook, N. J., in the analytical research department, and for two years since the war was with Foster Wheeler Corp., New York, in the process development division. During the war, Mr. Freeman served 2½ years in the European Theater as an intelligence officer and is now a major in the U. S. Army Reserve Corps.

Hynes Pitner recently resigned as vice president in charge of sales and a director of Pharis Tire & Rubber Co., to enter in an executive capacity, William S. Moore, Inc., both of Newark, O., wholesale distributer of automotive supplies.

H. E. Selby, formerly in charge of the McCordi Corp., research laboratories, has been appointed research director for Bishop Gutta-Percha Co., 420 E. 25th St., New York 10, N. Y.

John J. Freeman

Frank J. Smith has been appointed advertising and sales promotion manager of Philip Carey Mfg. Co., Cincinnati, O. He succeeds Harold D. Bates, recently promoted to general merchandise manager. Mr. Smith joined Carey in January, 1948, after several years in the sales and advertising departments of Owens-Corning Fiberglas Corp. He is a graduate of Ohio State University and a veteran of World War II.

Charles W. Tremitiere recently was appointed assistant director of the automotive sales division of Thermoid Co., Trenton, N. J. He formerly had been territory sales representative for western New York State.

Raymond B. Seymour has been made director of the special products research division of Johnson & Johnson, New Brunswick, N. J. Formerly director of the Industrial Research Institute of the University of Chattanooga, Dr. Seymour has done considerable work on plastics and textiles with Monsanto Chemical Co. and Goodyear Tire & Rubber Co.

Gilbert MacIntosh, purchasing agent for P. C. Cow & Co., Ltd., London, S.W.16, England, and affiliated companies, left England on September 25 for an extended tour of the United States and Canada. His address for communications during this trip is: Britam Agencies, Inc., 245 Fifth Ave., New York 16, N. Y.

J. A. Fouche is the new manager of the diversified products sales department of Seiberling Rubber Co., Akron, O. Formerly assistant manager of the department, which supplies automobile accessories and related merchandise to Seiberling tire dealers, the new manager succeeds Paul B. Means, resigned. Mr. Fouche joined Seiberling in 1945, after previous service with Firestone Tire & Rubber Co. and The General Tire & Rubber Co.

S. R. Zimmerman, Jr., new director of friction material research and development for Raybestos-Manhattan, Inc., Passaic, N. J., will direct the corporation's research and development activities on its friction materials at its plants in Stratford, Conn., Manheim, Pa., Passaic, and North Charleston, S. C. Prior to 1940, Mr. Zimmerman served at the United States Asbestos Division as industrial engineer, in the laboratory and engineering department, and as assistant sales manager. He has been with the division for 16 years at Manheim, where he will continue to make his office.

Carl J. Lamb has become consulting engineer for The Hydraulic Press Mfg. Co., Mount Gilead, O. His duties will embrace the investigation and reporting to management on projects dealing with markets, products, etc. Among the companies Mr. Lamb has served in engineering and commercial capacities are Westinghouse Electric Corp., The Sharples Corporation and Hydropress, Inc.

Joel M. Bowly, president, The Eagle-Picher Co., Cincinnati 1, O., was a speaker at the sixty-first annual meeting of the American Institute of Accountants held in Chicago, Ill., last month.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. Year ended June 30, 1948: net income, \$11,578,223, equal to \$4.23 each on 2,737,868 common shares; net sales, \$245,235,055.

Baldwin Rubber Co., Pontiac, Mich. Year ended June 30, 1948: net profit, \$656,870, equal to \$1.67 each on 393,762 capital shares, compared with \$855,968, or \$2.72 each on 315,010 shares, in the preceding 12 months.

Belden Mfg. Co., Chicago, Ill. Initial half, 1948: net profit, \$375,850, equal to \$1.17 a common share, against \$291,640, or \$2.54 a share, in last year's half; sales, \$9,472,820, against \$9,554,747.

Borg-Warner Corp., Chicago, Ill., and subsidiaries. First half: net profit, \$14,587,832, equal to \$6.09 a share, compared with \$9,999,606, or \$4.13 a share, in the same months of 1947; net sales, \$161,877,865, against \$131,504,956.

Brown Rubber Co., Inc., Lafayette, Ind., June half: net profit, \$428,110, equal to \$1.70 a share, against \$413,300, or \$1.65 a share, in the same months of 1947.

Crown Cork International Corp., Baltimore, Md., and wholly owned domestic subsidiaries. June half, 1948: net profit, \$235,756, equal to \$1.25 a share on Class A stock on which undeclared dividends amounted to \$1.85 a share on June 30, contrasted with \$233,046, or \$1.24 a share, in the like period last year.

Dewey & Almy Chemical Co., Cambridge, Mass. First half, 1948: consolidated net profit, \$322,258, equal to \$1.01 each on 319,949 shares, against \$335,351, or \$1.09 a share, in the 1947 half.

DeVilbiss Co., Toledo, O., and wholly owned subsidiaries. Six months to June 30: net income, \$313,425, equal to \$1.04 each on 300,000 common shares, compared with \$360,602, or \$1.20 a share, in the corresponding period last year; provision for federal taxes, \$242,300, against \$288,600.

Diamond Alkali Co., Painesville, O. First half, 1948: net income, \$2,273,470, equal to \$2.09 a share, against \$2,235,230, or \$2.10 a share, in the 1947 months.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and wholly owned subsidiaries. Six months ended on June 30: net income, \$62,611,127, equal to \$5.12 each on 11,146,103 common shares, contrasted with \$61,619,650, or \$5.13 each on 11,121,927 shares, the year before; sales, \$457,061,050, against \$378,671,184.

Endicott Johnson Corp., Endicott, N. Y., and subsidiaries. Six months to May 29: net profit, \$1,629,956, against \$1,778,735 in the same period last year; net sales, \$73,694,815, against \$66,702,214.

Dow Chemical Co., Midland, Mich., and subsidiaries. Year ended May 31, 1948: net income, \$21,066,646, equal to \$3.72 each on 4,994,824 common shares, compared with \$12,729,990, or \$2.31 a share, in the preceding fiscal year; sales, \$170,696,037, against \$130,426,839; reserve for depreciation, \$14,178,366, against \$8,595,259; income taxes, \$12,445,364, against \$8,208,393; current assets, \$83,154,448, against \$59,876,211; current liabilities, \$29,064,150, against \$26,778,874.

Faultless Rubber Co., Ashland, O. Year ended June 30, 1948: net profit, \$448,439, equal to \$3.42 a share, against \$458,411, or \$3.50 a share, in the preceding 12 months.

Garlock Packing Co., Palmyra, N. Y. First half, 1948: net income, \$811,600, equal to \$1.94 each on 418,500 shares, against \$746,916, or \$1.78 a share, in the '47 period.

General Cable Corp., New York, N. Y. First half, 1948: \$2,180,047, equal to 94¢ each on 1,905,814 common shares, against \$3,265,910, or \$1.48 each on 1,898,614 shares, in the 1947 half.

General Motors Corp., New York, N. Y. First six months, 1948: net income, \$206,763,672, equal to \$4.55 a common share, against \$137,559,902, or \$2.97 a share, in the same period of 1947; sales, \$2,234,705,927, against \$1,746,421,483.

Glidden Co., Cleveland, O. Nine months ended July 31: net profit, \$5,630,161, equal to \$3.02 a common share, contrasted with \$6,088,761, or \$3.25 a share, a year earlier; sales, \$154,202,488, against \$138,584,700.

Goodyear Tire & Rubber Co., Akron, O., and subsidiaries. Six months to June 30: net earnings, \$14,191,648, equal to \$6.16 each on 2,065,411 common shares, contrasted with \$11,601,416, or \$4.90 a share, 12 months before; net sales, \$346,079,544, against \$316,467,215; reserve for contingencies on foreign investments, \$3,000,000, against \$2,000,000; federal income taxes, \$9,235,000, against \$11,250,000; foreign income taxes, \$5,780,676, against \$6,706,887.

Hewitt-Robins, Inc., Buffalo, N. Y. Second quarter, 1948: net income, \$342,810, equal to \$1.23 a common share, compared with \$352,742, or \$1.27 a share, in the corresponding quarter of 1947; net sales, \$5,682,720, against \$5,592,059.

International Rubber Co., Inc., New York, N. Y., and subsidiaries. First six months, 1948: net loss, \$122,708, compared with net loss of \$12,973 in the '47 half; sales, \$92,317, against \$1,298,788.

Minnesota Mining & Mfg. Co., St. Paul, Minn. First half, 1948: net income, \$5,724,260, equal to \$2.83 a share, contrasted with \$5,595,949, or \$2.87 a share, in the 1947 period.

O'Sullivan Rubber Corp., Winchester, Va. First six months, 1948: net income, \$26,547, equal to 3¢ a common share; net sales, \$1,372,458.

Johnson & Johnson, New Brunswick, N. J., and subsidiaries. Initial half, 1948: net income, \$6,017,759, equal to \$3.24 each on 1,792,720 common shares, contrasted with \$3,646,321, or \$1.92 each on 1,817,740 shares, in the corresponding months of 1947; sales, \$82,482,658, against \$69,437,789.

Link-Belt Co., Chicago, Ill., and subsidiaries. First six months, 1948: net income, \$4,988,912, equal to \$6.16 a share, compared with \$3,341,955, or \$4.14 a share, in last year's half; net sales, \$52,514,296, against \$41,891,417; income taxes, \$3,310,000, against \$2,200,000.

Monsanto Chemical Co., St. Louis, Mo. June half: net earnings, \$7,926,759, equal to \$1.73 each on 4,272,531 common shares, compared with \$9,275,133, or \$2.23 each on 3,963,163 shares, in last year's half: sales, \$78,739,148, against \$71,085,736.

National Automotive Fibres, Inc., Trenton, N. J., and wholly owned subsidiary. First half, 1948: net profit, \$1,160,564, equal to \$1.22 each on 953,779 common shares, against \$949,169, or \$1.00 a share, in the 1947 half; net sales, \$22,907,331, against \$18,271,977.

St. Joseph Lead Co., New York, N. Y., and domestic subsidiaries. Initial half, 1948: net income, \$5,948,539, against \$6,706,814 in last year's half; net sales, \$40,903,469, against \$38,258,533.

Standard Oil Co. (Indiana), Chicago, Ill., and subsidiaries. First six months, this year: net earnings, \$66,179,148, equal to \$4.33 each on 15,284,806 shares, contrasted with \$40,936,430, or \$2.68 a share, in the first half last year; provision for income taxes, \$22,970,000, against \$10,823,920; sales and operating revenues, \$593,761,570, against \$406,253,053.

Struthers Wells Corp., Titusville, Pa. Six months ended May 31, 1948: net income, \$622,566, equal to \$4.90 each on 113,079 common shares.

Sun Chemical Corp., New York, N. Y., and subsidiaries. Initial half: net profit, \$445,518, equal to 33¢ each on 1,196,283 common shares, compared with \$804,038, or 63¢ a share, in the same half last year; net sales, \$17,883,823, against \$18,577,083; reserve for income taxes, \$335,500, against \$568,400.

United Carbon Co., Charleston, W. Va., and subsidiaries. First half: net profit, \$1,568,806, equal to \$1.97 a share, against \$1,558,594, or \$1.96 a share, in last year's period.

United States Rubber Co., New York, N. Y. January 31-June 30: net earnings, \$10,889,643, equal to \$4.70 a common share, contrasted with \$11,020,729, or \$4.78 a share, in the 1947 period; net sales, \$278,120,805, against \$283,329,180.

(*"Dividends Declared" appears on page 130.*)

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Patents and Trade Marks

APPLICATION

United States

2,445,791. **Remoldable Last of Polystyrene, Rubber and Rosin, and Filler, as Ground Cork, Wood Flour, and Cotton Flock.** S. P. Lovell, Newtonville, Mass.

2,446,018. **Garter.** B. D. Miskimen, Columbus, O.

2,446,119. **Glass-Fiber Reinforced Plastics.** E. White, R. Steinman, and L. P. Biefeld, Newark, assignors to Owens-Corning Fiberglas Corp., Toledo, both in O.

2,446,190. **Inflatable Leak Stopper.** C. A. Oding, Alameda, Calif.

2,446,224. **Piston Ring Including an Endless Annular Component of Rubber or Similar Material of T-Shaped Cross-Section.** F. D. Frisby and M. M. Marien, assignors to Ramsey Accessories Mfg. Corp., all of St. Louis, Mo.

2,446,243. **For Attaching a Member of a Relatively Stable Material to a Member of Natural or Synthetic Rubber, a Joint Construction Including a Recess in the Rubber Member Filled with Thermosetting Binding Material.** N. S. Reynolds, St. Louis, Mo.

2,446,287. **Mud Shield for Heels.** C. G. Jacobsen, Chicago, Ill.

2,446,292. **Insulated Electrical Conductor with an Elastic Jacket Formed of a Homogeneous Plastic with Good Flame and Moisture Resistance, and Embracing the Jacket a Thin Strong Film of Synthetic Linear Polyamide.** E. S. McConnel, Scarborough, N. Y., and W. K. Priestly, West Barrington, and V. F. Volk, Bristol, both in R. I., assignors to United States Rubber Co., New York, N. Y.

2,446,294. **High-Speed Belt.** L. W. Mitchell, assignor to Gates Rubber Co., both of Denver, Colo.

2,446,302. **Collapsible and Inflatable Baby Carriage.** M. W. Newberry, South Windsor, Conn.

2,446,310. **V-Type Belt.** T. W. Steinke, assignor to Gates Rubber Co., both of Denver, Colo.

2,446,311. **Power-Transmission Belt.** E. R. Traxler, Stow, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,446,328. **Protective Device for Preventing the Accumulation of Ice on an Airfoil.** E. E. Heston, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,446,380. **Shaft Seal Including an Annular Mounting Section and an Annular Shaft Engaging Section Formed of One Piece of Yieldable Rubber-Like Material.** G. L. Meyers, Willoughby, and J. C. Shutt, Wickliffe, assignors to Ohio Rubber Co., Willoughby, both in O.

2,446,387. **Cable Suitable for X-Ray Voltages.** T. F. Peterson, Shaker Heights, O.

2,446,448. **Combination Corrective Sole and Outer Supporting Element.** H. L. Whitman, East Bridgewater, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,446,449. **Combination Sole and Arch Support Member.** H. L. Whitman, East Bridgewater, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,446,493. **Jar Ring.** C. L. Silvia, Rockland, and A. Smith, Peabody, assignors to Boston Woven Hose & Rubber Co., Cambridge, all in Mass.

2,446,513. **Pulpstone Joint Material of Layers of Natural and Synthetic Rubbers.** Y. H. Nordstrom, assignor to Norton Co., both of Worcester, Mass.

2,446,627. **Heel Piece for Boots and Shoes.** E. Bler, Geneva, Switzerland.

2,446,811. **Self-Sealing Fuel Tank.** R. A. Crawford, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,446,815. **Self-Sealing Fuel Tank.** J. M. Davies, J. J. Shipman, and W. L. Davidson, all of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,446,817. **Vulcanized Rubber Bonded Grinding Wheel.** F. W. Feller, Bloomfield, assignor to Weldon Roberts Rubber Co., Newark, both in N. J.

2,446,902. **Elastic Ankle Support.** J. Brand, Pittsburgh, Pa.

2,446,921. **Lined Rubber Glove.** W. F. Grant, Miami, Fla.

2,447,284. **Shoe and Hosiery Protector.** A. N. Sidnam, New York, N. Y., B. Bolte, New Canaan, Conn., and T. C. Neary, New York, N. Y.

2,447,512. **Method of Attaching a Heel to a Shoe, Which Includes the Use of Plastic Retaining Means and the Injection of Flowable Resin.** J. F. Leahy, Beverly, Mass., assignor to United Shoe Machinery Corp., Flemington, N. J.

2,447,708. **Bathing Cap.** E. McCaffrey, Jamaica, N. Y.

2,447,905. **Rotable Rubber Heel.** B. Gilowitz, Bronx, assignor of $\frac{1}{3}$ to I. Skrilow and $\frac{1}{3}$ to A. Levin, both of New York, both in N. Y.

Dominion of Canada

450,195. **In a Device for Protection against the Formation of Ice, a Surface Coating of a Rubber-Like Substance.** J. G. L. Duval, Saint-Cyr-sur-Mer, Var, France, assignor to Olaer Patent Co., New York, N. Y., U.S.A.

450,246. **Storage Battery Electrode Pencil of Active Material about Which Is Helically Wound a Continuous Thread of Vulcanized Rubber or Extruded Thermoplastic Material.** H. J. Schelhammer, Whitestone, L. I., assignor to American Hard Rubber Co., New York, both in N. Y., U.S.A.

450,304. **Gasket of Rubberized Asbestos Fiber Strip Having a Protective Wrapping of a Thin Flexible Heat and Solvent Resistant Tape.** E. J. Poltorak, Somerville, N. J., assignor to Johns-Manville Corp., New York, N. Y., both in the U.S.A.

450,421. **Extrusion Die Consisting of a Tetrafluoroethylene Polymer.** K. L. Berry, Hockessin, and J. R. Downing, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, both in Del., U.S.A.

450,546. **Laminated Structure in Which the Bonding Agent Is a Blend of Phenol Rubber and a Heat-Converted-*in-situ* Phenol-Formaldehyde Resol.** H. E. Schroeder, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

United Kingdom

604,749. **Coated Sheet Materials.** Imperial Chemical Industries, Ltd., and S. C. Frowde.

604,827. **Flexible Electric Cables.** Pirelli-General Co., Ltd.

604,835. **Splashguards for Footwear.** W. H. Horsfield.

604,836. **Toy Catapults.** Millard Bros., Ltd., and J. W. McCallum.

604,918. **Tennis Balls.** J. Barville.

604,957. **Microporous Diaphragms or Separators for Electric Accumulators.** Chloride Electric Storage Co., Ltd. (J. C. Duddy).

605,024. **Collapsible Fuel Cells or Tanks.** United States Rubber Co.

605,508. **Expansion Joints for Concrete and the Like Roads, Floors, etc.** Rubber Cement Products, Ltd., and W. H. Bodger.

605,697. **Seat Cushions.** Firestone Tire & Rubber Co.

605,723. **Shock Absorber.** Gabriel Co.

605,757. **Whipped, Braided, or Twisted Elastic Threads and Fabrics Utilizing Such Threads.** A. Silvain.

605,767. **Shaped Polyamid Products.** Imperial Chemical Industries, Ltd.

PROCESS

United States

2,446,075.—**Rubber Crumbs.** G. W. Blair, Mishawaka, Ind., assignor to United States Rubber Co., New York, N. Y.

2,446,281. **Corrugated Tube.** W. G. Harding, Ridgewood, N. J., assignor to United States Rubber Co., New York, N. Y.

2,446,621. **Precision Anti-Vibrating Mounting.** L. F. Thiry, Montclair, N. J., assignor to General Tire & Rubber Co., Akron, O.

2,446,771. **Continuous Process of Imparting Ornamental Finish to Thermoplastic Sheets.** T. M. Knowland, Belmont, assignor to Boston Woven Hose & Rubber Co., Cambridge, both in Mass.

Dominion of Canada

450,099. **Molding Plastic Material.** J. B. Whitmore, Bloomfield, W. Makenny, Mountain View, and F. A. Newcombe, Nutley, all in N. J., U.S.A., assignors to Canadian Westinghouse Co., Ltd., Hamilton, Ont.

450,444. **Mechanically Stabilized Shape of Polystyrene.** J. Bailey, West Hartford, and F. E. Wiley, assignors to Plax Corp., both of Hartford, both in Conn., U.S.A.

United Kingdom

604,512. **Coated Sheet Material.** Imperial Chemical Industries, Ltd. (E. I. du Pont de Nemours & Co., Inc.).

604,876. **Protective Clothing.** Imperial Chemical Industries, Ltd., and H. Shepherd.

604,964. **Bonding Rubber to Metal, Glass, etc.** Dunlop Rubber Co., Ltd. (Dunlop Rubber Australia, Ltd.).

605,023. **Cellular Synthetic Resin Material.** United States Rubber Co.

605,105. **Perforated Sheets of Thermoplastic Resin Compositions.** Imperial Chemical Industries, Ltd., and W. E. F. Gates.

605,519. **Cellular Materials.** Expanded Rubber Co., Ltd., A. C. Hutchinson, and S. D. Eagleton.

605,579. **Dry Spinning of Solutions of Polymerized Vinyl Compounds.** Soc. Rhodiaceta.

605,766. **Embossing Sheet Materials Based on Polyvinyl Chloride.** Imperial Chemical Industries, Ltd., and W. L. Brogan.

605,820. **Molding Articles of or Including Synthetic Resins.** K. W. Mieszkis.

CHEMICAL

United States

2,445,794. **Methyl Silicone Elastomers Containing Si-Bonded Vinyl Radicals.** J. Marsden, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,445,925. **Acrylic Esters of Secondary Alcohols.** C. E. Rehberg, Glenside, and C. H. Fisher, Abington, both in Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.

2,445,944. **Isolation of Styrene by Azeotropic Distillation with Picolines and Lutidines.** K. H. Engel, Teaneck, N. J., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,445,970. **Method of Polymerization.** R. C. Reinhardt, assignor to Dow Chemical Co., both of Midland, Mich.

2,446,049. **Copolymer of Isopropenyl Toleune and Acrylate.** E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,446,072. **Dialkenyl Sulfides.** R. T. Armstrong, Johnson City, Tenn., assignor to United States Rubber Co., New York, N. Y.

2,446,101. **Creaming Synthetic Rubber Latices.** C. R. Peaker, Union City, Conn., assignor to United States Rubber Co., New York, N. Y.

2,446,107. **Improved Method of Creaming Synthetic Rubber Latices.** J. S. Rumbold, Woodbridge, Conn., assignor to United States Rubber Co., New York, N. Y.

2,446,115. **Improved Method of Creaming Synthetic Rubber Latices with a Vegetable Mucilage.** E. C. Svendsen, Mishawaka, Ind., assignor to United States Rubber Co., New York, N. Y.

2,446,167. **As a New Chemical Compound, a 2,3-Dicyano-3-2-Yl Ester o a Monocarboxylic Acid.** E. J. Prill, Creskill, N. J., assignor to United States Rubber Co., New York, N. Y.

2,446,171. **Acetals from a Mixture of a Vinyl Ester and a Non-Tertiary Alcohol.** W. J. Croxall, Bryn Athyn, and H. T. Neher, Bristol, assignors to Rohm & Haas Co., Philadelphia, all in Pa.

2,446,172. **2-Acylamino-1,3-Butadienes.** J. B. Dickey, assignor to Eastman Kodak Co., both of Rochester, N. Y.

2,446,382. **2-Fluoro-1,3-Diene Polymers.** W. E. Mochel, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,446,429. **Cellular Phenolic Resin from a Composition Including the Product of Partial Reaction of Phenol and an Aldehyde, a Water-Soluble Salt of Carbonic Acid, and a Water-Soluble Sulfonic Acid.** J. D. Nelson and P. V. Steenstrup, both of Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.

2,446,536. **Nitration of Styrene-Isobutylene Polymer Films.** P. E. Hardy, Elizabeth, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,446,728. **Removing Furfural Polymers from Furfural Contaminated therewith.** G. Thodos, Evanston, Ill., assignor to Phillips Petroleum Co., a corporation of Del.

2,446,867. **Thermosetting Composition Including a Urea-Formaldehyde Reaction Product and the Guanidine Salt of a Mono-Sulfonic Acid of a Hydrocarbon of the Benzene Series.** D. E. Cordier, assignor to Libbey-Owens-Ford Glass Co., both of Toledo, O.

2,446,897. **Liquid Phase Polymerization of Isobutylene, Butadiene, Isoprene, or Styrene at a Temperature between —30 and —160° C**

in the Presence of a Double Salt of a Metal Chloride and a Saturated Monobasic Fatty Acid. D. W. Young, Roselle, and H. B. Kellog, Union City, both in N. J., assignors to Standard Oil Development Co, a corporation of Del.

2,446,976. **Color Stable Vinyl Resin Including Zinc Stearate and a Stearate of an Alkali Metal or Alkaline Earth Metal.** E. Cousins, assignor to Wingfoot Corp., both of Akron, O.

2,446,984. **Preparing a Thermosetting Plastic by Mixing a Copolymer of Vinylidene Chloride and Vinyl Chloride with a Heterocyclic Amine.** T. H. Rogers, Jr., and R. D. Vickers, assignors to Wingfoot Corp, all of Akron, O.

2,447,055-056. **Expanded Thermoplastic Materials.** A. Cooper, assignor to Expanded Rubber Co., Ltd., both of Croydon, England.

2,447,289. **Polymerization of Vinyl and Vinylidene Chlorides in the Liquid Phase in the Presence of an Aqueous Organic Diluent in Which the Sole Organic Component Is a Water-Soluble Fatty Acid Having not More Than Four Carbon Atoms in the Molecule.** H. P. Staudinger, Ewell, and M. D. Cooke, Banstead, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

2,447,367. **Soluble Resinous Composition Including the Reaction Products of a Rosin-Polyhydric Alcohol Ester and a Saturated Polymer Containing Hydroxyl-Reactive Groups.** J. B. Rust and W. B. Canfield, both of Montclair, N. J., assignors, by direct and mesne assignments, of ½ to Montclair Research Corp. and ½ to Ellis-Foster Co., both corporations of N. J.

2,447,398. **A Gamma Polyvinyl Chloride Resin Solution.** B. de Supinski, Parkville, assignor to Glenn L. Martin Co., Middle River, both in Md.

2,447,481. **Synthesizing Aliphatic Mercaptans and Sulfides from Hydrogen Sulfide.** R. T. Bell and C. M. Thacker, both of Highland Park, assignors to Pure Oil Co., Chicago, both in Md.

2,447,611. **Preparing Organo-Poly-Siloxane Resins from Mixtures Containing Phenyl and Methyl Substituted Silicon Chlorides Produced by Interaction of Silicon Tetrachloride with Phenyl and Methyl Grignard Reagents.** W. R. Collings, H. N. Fenn, and H. J. Fletcher, assignors to Dow Corning Corp., all of Midland, Mich.

2,447,621. **Urea-Formaldehyde Molding Composition.** L. Smidth, New York, N. Y.

2,447,732-733. **Rubber Reclaiming Oil.** C. H. Campbell, Kent, O., and R. W. Ostermayer, Clairton, Pa.; Ostermayer assignor to Campbell.

2,447,773. **Polyvinyl Acetal Ketal Resins.** J. D. Ryan, Toledo, O., and F. B. Shaw, Jr., Baltimore, Md., assignors to Libbey-Owens-Ford Glass Co, Toledo, O.

2,447,810. **Resinous Interpolymer Including Styrene, Alpha-Methylstyrene or Alpha, Paradimethylstyrene and Maleodinitrile.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,447,811. **Resinous Interpolymer Containing 1,2-Dicyano-1-Chloroethylene.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,447,812. **Polymeric Material Containing 1,2-Dicyano-1-Methylethylene.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,447,813. **Resinous Interpolymer Containing 1,2-Dicyano-1-Phenylethylene.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,447,873. **Organohalosilanes.** E. G. Rochow, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,447,975. **Acetal Bodies from Polyhydric Alcohols.** W. J. Croxall, Bryn Athyn, and H. T. Neher, Bristol, assignors to Rohm & Haas Co., Philadelphia, all in Pa.

Dominion of Canada

449,616. **Composition Including a Water-Soluble Melamine-Formaldehyde Condensation Product and a Hydrated Alkaline Earth Oxide.** J. K. Wise, Evanston, assignor to United States Gypsum Co., Chicago, both in Ill., U.S.A., assignor to Canadian Gypsum, Ltd., Windsor, N.S.

449,648. **Depolymerization of Polystyrene.** T. B. Philip, Effingham, H. M. Stanley, Tadworth, and W. L. Wood, Tunbrudge, Wells, all in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

449,683. **Acrylonitrile from Ethylene Cyanohydrin.** LeR. U. Spence, Elkins Parks, assignor to Rohm & Haas Co., Philadelphia, Pa., both in U.S.A.

449,785. **Plastic Composition Including a Polyvinyl Chloride Resin and, as a Plasticizer therefor, a Hexitan Tetra-Ester.** R. M. Goepp, Jr., New Castle, assignor to Atlas Powder Co., Wilmington, both in Del., U.S.A.

449,790. **Molecularly Oriented Fiber Showing Characteristic Crystalline X-Ray Diffraction Pattern, Which Includes Acrylonitrile, Ethyl Acrylate, and Ethyl Methacrylate.** G. F. D'Alelio, Northampton, Mass., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

449,791. **Finely Divided Calcined Titanium Dioxide Treated with Vapors of a Methyl Silicon Chloride, as Dielectric Material.** M. M. Safford, Schenectady, N. Y., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

449,795. **In Polymerizing Ethylene in Aqueous Medium, the Steps of Adjusting the pH in the Range of 1-6, Polymerizing at 0 to 350° C and a Pressure above Atmospheric, and in the Presence of Benzoyl Peroxide Catalyst.** W. E. Hanford, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,797. **Polymerizing Ethylene in the Presence of Molecular Oxygen and a Peroxy Compound Catalyst, at from 40 to 350° C., at a Pressure between 300 and 1500 Atmospheres, Polymerization Proceeding in a Deoxygenated Aqueous Medium.** A. T. Larson, Wilmington, Del., U.S.A. assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,798. **Polymerizing Ethylene by Heating in Benzene with Material Consisting of Alkyl or Aryl Lithium Compounds as the Sole Catalyst; the Ethylene Contains Less Than 1,000 parts per Million of Oxygen.** W. E. Hanford and J. R. Roland, Wilmington, Del., and H. S. Young, Fairville, Pa., both in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,799. **Continuous Process for Polymerizing Ethylene to High Tensile Strength Solid Polymers.** A. T. Larson, Wilmington, Del., and N. W. Krase, Swarthmore, Pa., both in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,800. **Beta-Nitro-Ethyl Ethers.** A. E. W. Smith, R. H. Stanley, and C. W. Scaife, Norton-on-Tees, Durham, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,801. **Interpolymer of Isobutylene and Methyl Acetylene.** D. W. Huebner and J. E. Fearey, Norton-on-Tees, Durham, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,802. **Polymerizing Ethylene by Subjecting It to High Temperatures and Pressures in the Presence of Suitable Amounts of Free Oxygen, Water, and an Alkali and at a pH Higher Than 7.** M. D. Peterson, Edgemoor Terrace, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,803. **Fractionation of Solid Polymers of Ethylene.** N. W. Krase, Swarthmore, Pa., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,804. **Ethylene Polymers.** N. W. Krase, Swarthmore, Pa., and A. E. Lawrence, Wilmington, Del., both in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,805. **Ethylene Polymers.** C. H. Greenwalt, Greenville, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,806. **Ethylene Polymers.** L. Squires, Westtown, Pa., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,807. **Polyfluoroethyl Ethers.** W. E. Hanford, Easton, Pa., and G. W. Rigby, Wilmington, Del., both in the U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,808. **Coating Composition, Including a Vehicle Containing Drying Oil-Modified Alkyd or Phenol-Formaldehyde Resin, Pigment, Litharge, and Calcium Hydrate.** L. Balassa, Norwich, Conn., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,809. **Synthetic, Rubber-Like Material with High Oil and Freeze Resistance and Good Processing Characteristics, Obtained by Copolymerizing a Mixture of Butadiene 1,3 Acrylonitrile, and an Aliphatic Vinylethinyl Carbinol.** C. J. Mighton, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,810. **Improving the Processing Characteristics of Butadiene-Styrene Interpolymers by Incorporating o-Sulfobenzoic Anhydride.** J. R. Vincent, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,811. **Fabrication of Polytetrafluoroethylene Articles.** J. Alfthan and J. L. Chynoweth, both of New York, N. Y., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q.

449,813. **Polymerization of Ethylene.** M. J. Roedel, Talleyville, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,814. **Moistureproof, Heat Sealable, Cellulosic Wrapping Material.** L. M. Ellis, Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

449,832. **Bonding a Rubber to a Magnesium Metal with the Aid of a Mixture of Concentrated Sulfuric Acid and Ethylene Glycol.** J. R. Rafter, Sharon, Mass., assignor to Firestone Tire & Rubber Co., Akron, O., both in the U.S.A.

449,841. **Chlorinated Polythene Containing 0.1 to 5% of Sodium Lactate.** D. Whittaker, Northwich, England, assignor to Canadian Industries Ltd., Montreal, P.Q., assignor to Imperial Industries, Ltd., London, England

449,845. **Polymerizing a Mixture of Isobutylene and Butadiene in the Presence of a Polymerization Catalyst Capable of Liberating Oxygen in the Emulsion.** H. Hopff and C. W. Rautenstrauch, both of Ludwigshafen-on-Rhine, assignors to I. G. Farbenindustries, A. G., Frankfort a. M., both in Germany, assignor to Jasco, Inc., Baton Rouge, La., U.S.A.

449,866. **Waterproofing Bentonite by Treating with Lead Acrylate.** E. A. Hauser, Cambridge, Mass., assignor to Research Corp., New York, N. Y., both in the U.S.A.

449,921-922. **Polymerization of Diallyl Esters.** T. F. Bradley, Edgewood Arsenal, Md., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

450,033. **Producing Emulsion Polymerizates of Butadienes by Using Water Soluble Salts of Olefin Sulfonic Acids Containing 12-20 Carbon Atoms in the Molecule as the Emulsifying Agent.** G. E. Serniuk, Roselle, N. J., assignor to Standard Oil Development Co., Linden, N. J., U.S.A.

450,124. **Rubber Derivatives of the Cyclized Type Obtained from a Mixture of Rubber, an Alkali Metal Alum, Phosphorous Pentoxide and Free Sulfuric Acid, and Heating the Mixture to Procure an Exothermic Reaction Product.** R. M. Vance and C. A. Damicone, assignors to General Tire & Rubber Co., all of Akron, O., U.S.A.

450,128. **Pressure-Sensitive Adhesive Composition Including a Condensation Product of Castor Oil with a Maleic Half Ester of a Monohydric Alcohol, and a Compatible Cohesive Agent.** R. J. Priepke, North Brunswick, J. H. Emhigh, Milltown, and C. O. Pike, Highland Park, all in N. J., U.S.A., assignors to Johnson & Johnson, Ltd., Montreal, P.Q.

450,140. **New Composition of Matter Obtained by Heating until the Evolution of HCl Has Ceased a Rubber-Like Polymer of Chlor-Butadiene with Crude Tolyl Dichlor Phosphine.** G. D. Martin, Nitro, W. Va., assignor to Monsanto Chemical Co, St. Louis, Mo., both in the U.S.A.

450,184 **Cyclohexyl Alpha, Alpha, Beta-Trihalo Propionates.** J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

450,185. **Heating a Dichloropropionic Acid and Methanol to Produce Methyl-Beta-Chloro-Acrylate.** J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

450,186. **2,3-Dichloropropyl Alphachloroacrylate.** J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

450,280. **As Antioxidant for Rubber, a Dihydro Dihydroxy Napthalene in Which the Hydroxy Groups Are Either Ortho or Para to Each Other.** P. T. Paul, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q

450,281 **As Antioxidant for Rubber, an Aryl Aminoaryl Sulfonylamide.** P. T. Paul, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

450,282. **As Antioxidant for Rubber, a Para-Substituted Arylamino 2,2,4-Trialkyl Dihydroquinoline; the Para-substituent is on the Aryl Nucleus and a Character Inert to Acidic Reagents at below 170° C.** P. T. Paul, Naugatuck, Conn., U.S.A., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

450,283. **Preserving Polychloroprene by Incorporating therein a Tri-Cycloalkyl Phosphite.** L. H. Howland, Waterbury, and B. A. Hunter, Naugatuck, both in Conn., U.S.A., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

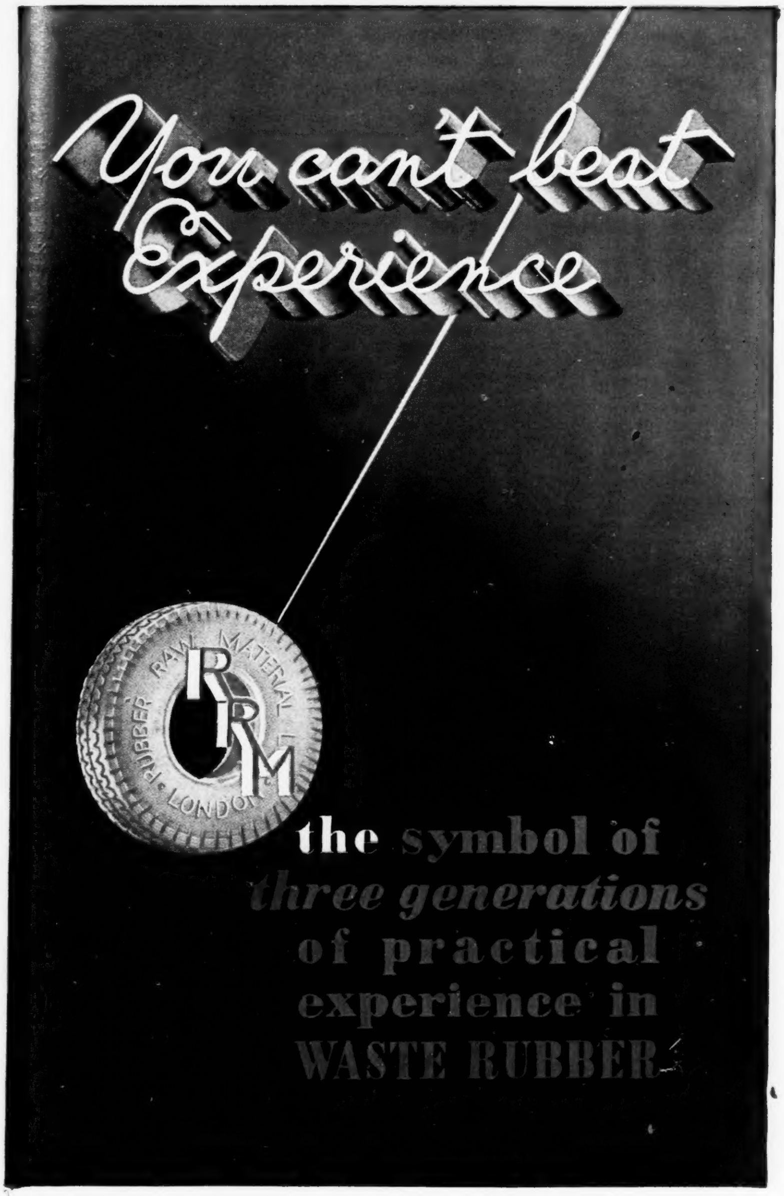
450,284. **Preserving Synthetic Elastomers by Incorporating therein Alkyl Thiourea.** R. R. Sterrett, Totowa, N. J., U.S.A., assignor to Dominion Rubber Co., Ltd. Montreal, P.Q.

450,328. **Finishing Isobutylene Polymers by Expelling Liquid Gas and Boron Fluoride Catalyst Entrapped in the Solid Polymer.** C. F. Van Gilder, Roselle, and H. C. Evans, Cranford, assignors to Standard Oil Development Co., Linden, all in N. J., U.S.A.

450,399. **Textile Product Made from Composite Synthetic Resin Filaments Treated to Polymerize at the Points of Intercrossing.** W. Wade, New York, N. Y., assignor to Sylvania Industrial Corp., Fredericksburg, Va., assignor to American Viscose Corp., Wilmington, Del., all in the U.S.A.

450,521. **Aqueous Phenolic Resin Solution.** D. A. Hurst, Haddonfield, N. J., assignor to Barrett Co., assignor by its trustees on dissolution to Allied Chemical & Dye Corp., both of New York, N. Y., both in the U.S.A.

450,540. **Polymerizing a Halogen-Substituted 1,3-Butadiene in the Presence of a Di-Ester of an Aliphatic Alpha-Unsaturated Alpha-Beta-Dicarboxylic Acid and a Monohydric Unsaturated Alcohol.** C. J. Mighton,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Wilmington, Del., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

450,541. **Interpolymerization of Butadiene-1,3, 2-Chloro-Butadiene-1,3, or Their Methyl or Dimethyl Homologs, and Chlorocyano-Butadiene-1,3 or Its Methyl Homologs.** H. Gudgeon, E. Isaacs and W. McG. Morgan, all of Blackley, Manchester, England, assignors to Canadian Industries, Ltd., Montreal, P.Q.

450,542. **Polymerization of Ethylene at between 20° and 400° C and a Pressure of at Least 4 Atmospheres in the Presence of a Hydrazine or Hydrazinium Compound.** W. E. Hanford, Easton, Pa., U.S.A., assignor to the Canadian Industries, Ltd., Montreal, P.Q.

450,544. **Wet-Spinning Acrylonitrile Polymer Yarn by Extruding a Solution of Acrylonitrile Polymer in a Volatile Organic Solvent into a Spinning Bath of Glycerol.** W. W. Watkins, Buffalo, N. Y., U.S.A., assignor to the Canadian Industries, Ltd., Montreal, P.Q.

450,547. **Continuous Process for Homopolymerizing Ethylene.** M. D. Peterson, Oak Ridge, Tenn., U.S.A., assignor to Canadian Industries Ltd., Montreal, P.Q.

450,555. **Self-Sustaining Film of Polyvinyl Alcohol Containing Cetyl Dimethyl Benzyl Ammonium Chloride.** M. V. Noble, Kenmore, N. Y., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q.

450,573. **Stabilized Vinyl Resin Coating.** G. M. Powell and W. H. McKnight, both of Charleston, W. Va., U.S.A., assignors to Carbide & Carbon Chemicals, Ltd., Toronto, Ont.

450,597. **Chlorinated Polythenes.** J. R. Myles and P. J. Garner, Northwich, Cheshire, England, assignors to Canadian Industries Ltd., Montreal, P.Q., assignor to Imperial Chemical Industries, Ltd., London, England.

United Kingdom

602,312. **Resinous Compositions.** Distillers Co., Ltd., J. J. P. Staudinger, and M. D. Cooke.

602,314. **Coatings and Laminations.** A. Marks.

602,360. **Solutions of Polymerized Styrene Compounds.** Soc. Rhodiaceta.

602,444. **Coating Composition.** G. H. Young.

602,499. **Butadiene.** Phillips Petroleum Co.

602,510. **Creaming Synthetic Rubber Latices.** United States Rubber Co.

602,549-550. **Filaments and Fibers of Hydrolyzed Ethylene Vinyl Organic Ester Interpolymers.** E. I. du Pont de Nemours & Co., Inc.

602,582. **Mixing a High Molecular Substance with Asphaltic Bitumen or Pitch.** Naamlooze Vennootschap De Bataafsche Petroleum Mij.

602,609. **Ion-Exchange Resins Containing Reactive Silver.** Ocean Salts (Products), Ltd., F. L. Sos, and T. R. E. Kressman.

602,615. **Rubber-Like Products.** Les Usines de Melle.

603,076. **Organosiloxanes.** Corning Glass Works.

603,095. **Adhesive Latex.** Soc. Meridionale du Caoutchouc Someca.

603,099. **Vinyl Chloride.** Shell Development Co.

603,103. **Unsaturated Organic Sulfur Compounds.** Shell Development Co.

603,160. **Cyclic Ureas.** R. L. Evans.

603,223. **Oil-Soluble Resinous Products.** C. Arnold (Standard Oil Development Co.).

603,324-325. **Oil Phase Polymerization.** United States Rubber Co.

603,344. **Organic Nitro Compounds.** E. I. du Pont de Nemours & Co., Inc.

603,425. **Flame-Resistant Coating or Impregnating Compositions.** Johnson & Johnson (Great Britain), Ltd.

603,471. **Vinyl Ethers and Their Homologs.** Distillers Co., Ltd., P. L. Bramwyche, and M. Mugdan.

603,481-482. **Interpolymers.** E. I. du Pont de Nemours & Co., Inc.

603,546. **Oil Phase Polymerization.** United States Rubber Co.

603,628. **Sensitizing Rubber Latex.** P. Chassaing.

603,631. **Bonding Natural and Synthetic Rubber to Metal.** Firestone Tire & Rubber Co.

603,817. **Plasticized Synthetic Resin Compositions.** Distillers Co., Ltd., D. Faulkner, H. M. Stanley, and J. J. P. Staudinger.

603,835. **Synthetic Resin.** Soc. Generale des Huiles de Petrole.

603,855. **Fluorohydrocarbons.** Imperial Chemical Industries, Ltd.

603,872. **Polyformals.** Imperial Chemical Industries, Ltd.

603,873. **Compositions Including Polymers and Copolymers of Acrylonitrile.** E. I. du Pont de Nemours & Co., Inc.

603,952. **Interpolymers.** E. I. du Pont de Nemours & Co., Inc.

604,001. **Molding Materials.** National Cash Register Co.

604,011. **Stabilized n-Vinyl Pyrrole Compounds.** General Aniline & Film Corp.

604,138. **Self-Sustaining Flexible Films.** Firestone Tire & Rubber Co.

604,173. **Preserving Rubber.** Soc. Auxiliaire de l'Institut Français du Caoutchouc.

604,215. **Dimethyl Silicone Elastomers.** British Thomson-Houston Co., Ltd.

604,284. **Polymerizing Esters of Unsaturated Alcohols.** Shell Development Co.

604,361. **Improving the General Qualities of Rubbers, Especially Synthetic Rubber.** Usines de Melle.

604,364. **Plastic Compositions Based on Polyvinyl Butyral.** Soc. des Usines Chimiques Rhone-Poulenc.

604,371. **Stable Emulsions of Water-Insoluble Resins or Cellulose Derivatives.** H. E. Potts (Shawinigan Chemicals, Ltd.).

604,412. **Copolymers of Vinyl Esters and Vinylidene Compounds by Polymerization in Emulsion.** Naamlooze Vennootschap De Bataafsche Petroleum Mij.

604,480. **Synthetic Resin Coating Compositions.** L. Berger & Sons, Ltd., E. J. Ross, and W. J. Smith.

604,492. **Vinyl Ethers and Polymers thereof.** General Aniline & Film Corp.

604,533. **Polymerizing Unsaturated Organic Compounds.** Shell Development Co.

604,580. **Polymerization Processes.** E. I. du Pont de Nemours & Co., Inc.

604,599. **A Synthetic Resin.** T. R. McElhinney and W. J. Gibbens, Jr.

604,626. **Adhesives.** Bakelite, Ltd., and J. Wood.

604,708. **Modified Synthetic Polymeric Materials.** E. I. du Pont de Nemours & Co., Inc., W. E. Hanford, and J. R. Roland.

604,834. **Adhesive Compositions.** Imperial Chemical Industries, Ltd., T. J. Meyrick, and J. T. Watts.

604,851. **Plastic Compositions.** Distillers Co., Ltd., D. Faulkner, and J. J. P. Staudinger.

604,879. **Copolymers of Vinyl Compounds.** British Thompson-Houston Co., Ltd.

604,903. **Synthetic Resin Compositions for Low-Pressure Paper Base Laminates and Wood Surfacing.** American Cyanamid Co.

604,965. **Vulcanization of Rubber.** Dunlop Rubber Co., Ltd. (Dunlop Rubber Australia, Ltd.)

604,985. **Highly Polymeric Linear Esters and Filaments, Fibers, Etc. therefrom.** Imperial Chemical Industries, Ltd., J. G. Cook, J. T. Dickson, A. R. Lowe, and J. R. Whinfield.

605,145. **Thermosensitive Material.** General Motors Corp.

605,186-187. **Polyhydric Phenol-Aldehyde Resin Adhesives.** Pennsylvania Coal Products Co.

605,218. **Silicone Resin Compositions.** British Thomson-Houston Co., Ltd.

605,277. **Vinyl Chloride.** Solvay & Cie.

605,381. **Thermoplastic Compositions.** British Celanese, Ltd.

605,388. **Synthetic Resins.** A. Holden & Sons, Ltd., and S. R. W. Martin.

605,417 **Resinous Condensation Products.** British Industrial Plastics, Ltd., A. Brookes, and F. L. Hudson.

605,441. **Silicate Plastics.** Haveg Corp.

605,446-447. **Polymeric Materials.** E. I. du Pont de Nemours & Co., Inc.

605,460. **Treatment of Chlorine-Containing Rubber Derivatives.** Firestone Tire & Rubber Co.

605,516. **Emulsion Polymerization of Vinyl Halides.** Naamlooze Venootschap De Bataafsche Petroleum Mij.

605,517. **Copolymerization Products.** Naamlooze Venootschap De Bataafsche Petroleum Mij.

605,526. **Synthetic Resinous Compositions.** E. I. du Pont de Nemours & Co., Inc.

605,535. **Bonding Rubber and Synthetic Rubber to Metals.** Firestone Tire & Rubber Co.

605,588. **Plasticizing, Reclaiming and Reworking Vulcanized Rubber.** Gestetner, Ltd., and A. De Waele.

605,597. **Synthetic Resinous Molding Compositions.** H. Weber.

605,606. **Polymerization Products from Vinyl Chloride.** Naamlooze Vennootschap De Bataafsche Petroleum Mij.

605,651. **Coating Surfaces with Compositions Including Synthetic Resins.** Imperial Chemical Industries, Ltd., and W. E. F. Gates.

605,768. **Resinous Condensation Products.** E. I. du Pont de Nemours & Co., Inc.

605,770-771. **Removal of Color from Shaped Articles Including a Polymer or Copolymer of Acrylonitrile.** E. I. du Pont de Nemours & Co., Inc., J. C. Richards, and R. A Schneiderbauer

MACHINERY

United States

2,446,041. **Plastic Molding Press.** L. H. Blanchard, Worcester, Mass.

2,446,281. **Apparatus for Making Corrugated Tubes.** W. G. Harding, Ridgewood, N. J., assignor to United States Rubber Co., New York, N. Y.

2,446,623. **High-Frequency Progressive Bonding Apparatus for Plastic Materials.** E. S. Welch, Jr., Framingham, Mass., assignor to United Shoe Machinery Corp., Flemington, N.J.

2,446,657. **Rubber Masticating Machine and Indicator.** D. W. MacLeod, Ansonia, and R. H. Perkins, Milford, assignors to Farrel-Birmingham Co., Inc., Ansonia, both in Conn.

2,447,035. **Tire Repair Apparatus.** E. F. Shell, San Francisco, Calif.

2,447,129. **Extrusion Press.** H. Lorant, New York, N. Y.

2,447,256. **Plastics Molding Apparatus.** E. R. Knowles, Nashua, N. H.

2,447,415. **Double-Acting Press for Plastic Material.** G. A. Lyon, Allenhurst, N. J.

Dominion of Canada

449,240-241. **Machine to Cover Wires with Insulating Material.** G. H. Walton, J. C. Quayle, both of Helsby, and P. Jones, Kelsall, assignors to British Insulated Cables Ltd., Prescot, and, in liquidation, by D. McKellar, its liquidator, assignor to British Insulated Calender's Cables Ltd., London, all in England.

449,399. **Drive Mechanism for Tire Molds.** E. A. Glynn, assignor to Super Mold Corp. of California, both of Lodi, Calif., U.S.A.

449,447. **Molding Machine for Plastics and Other Moldable Materials.** W. S. Renier, Milwaukee, Wis., U.S.A.

449,472. **Plastics Extruder.** J. Brown, assignor to David Bridge & Co., Ltd., both of Rochdale, Lancashire, England.

449,478. **Apparatus for Producing a Sheath of Extrudable Insulating Material on a Movable Core.** G. H. Sittner, Schenectady, N. Y., U.S.A., assignor to Canadian General Electric Co., Ltd., Toronto, Ont.

449,502. **Apparatus for Free Blowing Thermoplastic Sheet Material.** R. S. Ames, R. W. McCullough, and M. P. H. Peterson, assignors to Goodyear Aircraft Corp., all of Akron, O., U.S.A.

449,503. **Female Jig for Centrifugal Formation of Thermoplastic Sheet Material into Canopies and the Like.** M. P. H. Peterson, Kewanee, Ill., assignor to Goodyear Aircraft Corp., Akron, O., both in the U.S.A.

449,564. **Extruder for Insulating Cores.** D. D. Jones, Towson, Md., assignor to Western Electric Co., Inc., New York, N. Y., both in the U.S.A.

449,570. **Friction Mechanism.** R. H. Meador, Jr., assignor to Wingfoot Corp., both of Akron, O., U.S.A.

449,589. **Rubber Extruder.** F. E. Brown, Hyde, Chester, England.

449,743. **Thermoplastic Material Extruder.** L. B. Green, Lakewood, O., U.S.A.

449,775. **Device to Strip Articles from Molds.** E. C. Kastner, assignor to Akron Standard Mold Co., both of Akron, O., U.S.A.

449,871. **Mold Section for a Platen Press.** D. G. Rempel, Akron, assignor to Sun Rubber Co., Barberton, both in O., U.S.A.

449,883. **Vulcanizer for Rubber-Covered Wire.** A. W. Ferre, Wellesley, and C. E. Blanchard, Randolph, assignors to B. F. Sturtevant Co., Boston, all in Mass., assignor to Westinghouse Electric Corp., East Pittsburgh, Pa., both in the U.S.A.

449,987. **Plastometer for Measuring Recovery of Unvulcanized Rubber and Other Materials of a Rubbery Nature.** H. A. Macdonald, Gravesend, Kent, assignor to W. T. Henley's Telegraph Works Co., Ltd., Dorking, Surrey, both in England.

450,187. **Extruder Apparatus.** K. B. Kilborn, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

450,189. **Wrapping Machine.** A. B. Clunan and I. F. Stalter, assignors to Wingfoot Corp., all of Akron, O., U.S.A.

450,216-217. **Apparatus for Molding Plastic Material.** L. B. Green, Lakewood, O., U.S.A.

450,238 **Device to Form Strands of Plastic Material.** E. D. Szantay, Chicago, Ill., U.S.A.

450,310. **Apparatus to Shape and Vulcanize Pneumatic Tires.** L. E. Soderquist, assignor to McNeil Machine & Engineering Co., both of Akron, O., U.S.A.

450,336. **Device for Making Sponge Rubber Articles.** G. W. Blair, W. J. Clayton, E. H. Clark, and J. F. Schott, all of Mishawaka, Ind., and A. W. Keen, Packanack Lake, N. J., assignors to United States Rubber Co., New York, N. Y., U.S.A.

450,367. **Device for Molding the Sole, Heel, and Shank of Footwear.** W. H. Doherty, Elmhurst, N. Y., U.S.A.

United Kingdom

602,434. **Apparatus for Forming Films and Coatings.** C. S. Francis, Jr.

603,130. **Preheating Ovens for Molding Plastics.** A. P. Summerfield.

603,177. **Apparatus for Pressing Rubber Articles.** United States Rubber Co.

603,228. **Vulcanizing and Like Presses.** W. E. Smith and W. Frost.

603,630. **Testers.** Firestone Tire & Rubber Co.

603,903. **Injection Molding Machine.** E. M. B. Co., Ltd., and G. N. Cadbury.

604,467. **Hydraulic Rams and Molding Presses.** S. D. Pollitt and C. G. Thompson.

605,150 **Injection Molding Machines.** W. Hill and A. Dunn.

605,278. **Means for Resoling Rubber Boots.** J. W. La Follette.

605,677. **Injection Molding Machine.** A. Herbert, Ltd., R. H. Bebb, and L. N. Jones.

UNCLASSIFIED

United States

2,445,913. **Mud and Snow Hooks for Tires.** H. W. Grosjean and E. M. A. Sizer, both of Milwaukee, Wis., and A. Zinda, Portland, Oreg.

2,445,947. **Combined Tire Chain Applicator and Mud Lug.** T. O. Hoppes, Tamaqua, Pa.

2,445,959. **Tire Pressure Switch.** H. R. Luper, Portsmouth, Va.

2,446,050. **Inner Tube Tester.** A. Kubin, Westlake, C. Kubin, North Olmsted, and A. Brondos, Jr., Lakewood, assignors to Reliable Spring & Wire Forms Co., Cleveland, all in O.

2,446,963. **Tire Removing Apparatus.** H. Stolz, Bound Brook, N. J.

2,447,021. **Trim Ring for Tires.** G. A. Lyon, Allenhurst, N. J.

2,447,225. **Emergency Wheel in Combination with a Pneumatic Tire Mounted Wheel.** D. E. Bennett, Larkspur, Calif.

2,447,357. **Emergency Tire Shoe.** A. J. Mosley, Euclid, assignor to National Bronze & Aluminum Foundry Co., Cleveland, both in O.

2,447,428. **Automobile Tire Guard.** J. O'Leary, Cleveland, assignor of ¼ to M. B. Baubach, Norwood, both in O.

2,447,435. **Tire Truck.** W. A. Settle, late of Jefferson, Oreg.; N. R. Settle, executrix.

2,447,474. **Device to Expand Rubber Rings.** A. O. Hammond, assignor, by mesne assignments, to Elastrator Co., Ltd., both of Blenheim, New Zealand.

2,447,689. **Pressure Indicator for Pneumatic Tires.** N. A. Dysart, Riverside, Calif., assignor of 37½% to G. L. Fox and 37½% to C. F. Smith, both of Amarillo, Tex.

2,447,740. **Tire Repair Clamp.** J. C. Crowley, Willoughby, assignor to Dill Mfg. Co., Cleveland, both in O.

2,447,777. **Tire Deflation Indicator.** A. J. Slovack, Houston, Tex.

Dominion of Canada

449,191. **Apparatus to Facilitate Mounting and Demounting Pneumatic Tires.** C. E. Branick, Fargo, N. D., U.S.A.

449,490. **Device to Prevent Creep between a Movable Tire Flange and the Rim of a Vehicle Wheel.** H. J. Butler, assignor to Dunlop Rubber Co., Ltd., both of London, England.

449,650. **Recovery of Fluosulfonic Acid in Manufacturing DDT.** C. W. Gates and W. P. Woods, both of Elmira, Ont., assignors to Dominion Rubber Co., Ltd., Montreal, P.Q.

449,651. **Recovery of Fluosulfonic Acid.** M. Kulka, Guelph, Ont., assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

449,652. **DDT.** C. W. Gates, Elmira, Ont. assignor to Dominion Rubber Co., Ltd., Montreal, P.Q.

449,738. **Brush Attachment for Erasers.** W. Edwards, Calgary, Alta.

449,833. **Truck Rim Design.** W. S. Brink, assignor to Firestone Tire & Rubber Co., both of Akron, O., U.S.A.

449,861. **Electric Cable Joint.** W. Holttum, Prescot, Lancashire, England, assignor to Phillips Electrical Works, Ltd., Brockville, Ont.

449,910. **Tire Tool.** I. C. Steven, Mount Royal, P.Q.

450,188. **Vehicle Wheel.** J. G. Swain, assignor to Wingfoot Corp., both of Akron O., U.S.A.

United Kingdom

604,216. **Attaching Soles to Shoes by Means of Adhesives Activated by a High-Frequency Field.** British United Shoe Machinery Co., Ltd. (United Shoe Machinery Corp.).

604,529. **Insulated Wire Strippers.** D. Wallis, A. H. Heir, H. Aldridge, and R. E. Mason.

604,845. **Brake Apparatus for Aircraft and Other Vehicle Wheels.** Dunlop Rubber Co., Ltd., and H. J. Butler.

605,301. **Stretch-Wrapping Device.** Wingfoot Corp.

605,511. **Device to Expand Rubber Rings, Etc.** E. L. W. Byrne (Elastrator Co., Ltd.).

TRADE MARKS

United States

439,823. **Fibron.** Resinoid plastic materials. Irvington Varnish & Insulator Co., Irvington, N. J.

439,841. Representation of a coat of arms including a wreath containing the letter: **"W".** Rigid and semi-rigid sheets surfaced with plastic materials. Western Products, Inc., Newark, O.

439,844. **Jetfilac.** Nitro celulose bases. Burbank Chemical Co., Burbank, Calif.

439,877. **Acryvin.** Syrups or solutions of polymerizable synthetic resins. Acryvin Corp. of America, Long Island, N. Y.

439,914. Representation of a circle upon which appear the letters: **"D"** and **"P".** Dental impression materials. S. E. Noyes, doing business as Dental Perfection Co., Los Angeles, Calif.

439,926. **Plastishield.** Breast shields. Plastishield, Inc., Minneapolis, Minn.

439,931. **Dixon.** Erasers. Joseph Dixon Crucible Co., Jersey City, N. J.

439,968. **Carboxymethocel.** Thickener, stabilizer, and suspending agent as an adhesive and as a sizing and film-forming agent. Dow Chemical Co., Midland, Mich.

439,970. **Acryloid.** Lacquers for protective coatings. Resinous Products & Chemical Co., Philadelphia, Pa.

439,985. **Scotch Boy.** Tape. Minnesota Mining & Mfg. Co., St. Paul, Minn.

439,994. Representation of a map of the United States containing the words: **"Automotive Industrial"** and the letters: **"A-I."** Brake linings, belts, hose and clutch facings. Sulco Sales Corp., New York, N. Y.

440,000. Representation of a playing-card spade containing the letter: **"A."** Automobile steering wheels. American Hard Rubber Co., New York, N. Y.

440,003. Representation of a banner containing the word: **"Westpoint."** Bicycle handle bar grips and automobile seat covers. Oakes & Co., Chicago, Ill.

440,020. **G S M.** Hose. Goodall Semi-Metallic Hose & Mfg. Co., Philadelphia, Pa.

440,043. Representation of a figure carrying a lining, and the word: **"Philblack."** Filler in rubber or synthetic rubber. Phillips Petroleum Co., Bartlesville, Okla.

440,047. **Chemocoat.** Resinous plastic material. Eronel Industries, Los Angeles, Calif.

440,048. **Eronel.** Resinous plastic material. Eronel Industries, Los Angeles, Calif.

440,049. **Thermodip.** Resinous thermoplastic composition. Eronel Industries, Los Angeles, Calif.

440,050. **Ultrapel.** Resinous plastic material. Eronel Industries, Los Angeles, Calif.

440,114. **Gaska-Seal.** Sealing compound. Puritan Co., Inc., Rochester, N. Y.

440,226. **Shirlastic.** Elastic fabric. I. B. Kleinert Rubber Co., Inc., New York, N. Y.

440,236. **Cerex.** Threads and yarns of synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

440,265. **By Bannister.** Toys. C. Bannister, New York, N. Y.

440,309. **Zyrox.** Insulating compounds. Union Carbide & Carbon Corp., New York, N. Y.

440,312. Representation of a map of Ohio containing the word: **"Femco."** Molds for use in molding rubber. Falls Engineering & Machine Co., Cuyahoga Falls, O.

440,324. **Rocking Horse Recordings.** Phonograph records. Synthetic Plastics Co., Newark, N. J.

440,334. **Kyanite.** Synthetic resin for surface coating materials. Boston Varnish Co., Everett, Mass.

440,342. **Cobra.** Phonograph records. Zenith Radio Corp., Chicago, Ill.

440,343. **ATV.** Wire. Anaconda Wire & Cable Co., New York, N. Y.

440,355. **Republic.** Phonograph records. Cecilie Music Co., Inc., New York, N. Y.

500,726. Representation of a circle containing the word: **"Laher."** Automotive equipment and accessories. Laher Spring & Tire Corp., Oakland, Calif.

500,761. **Wet-Pruf.** Surgical tape. Kendall Co., Boston, Mass.

500,764. Representation of a rectangle containing representations of Roman warriors and the word: **"Frem."** Prophylactic articles. Youngs Rubber Corp., New York, N. Y.

500,776. **Stabond.** Cements. C. M. Christie, doing business as Latex Co., Los Angeles, Calif.

500,783. **Mar-Not.** Hose nozzles. Goodyear Tire & Rubber Co., Akron, O.

500,788. Representation of a circle containing the letters: **"KS"** and the words: **"Sure Stop."** Tires and tubes. Kelly-Springfield Tire Co., Cumberland, Md.

500,800. **Flotex.** Waterproof rubberized sheeting. Holland-Rantos Co., Inc., New York, N. Y.

500,820. **Talon.** Surgical stocking cuffs. Talon, Inc., Meadville, Pa.

500,828. **=400=.** Tires. B. F. Goodrich Co., New York, N. Y.

500,833. **Super-Tex.** Surgeons' gloves. A. S. Aloe Co., St. Louis, Mo.

500,843. **RoZome.** Conductors, wires, and cables. Rome Cable Corp., Rome, N. Y.

500,859. **Chemclad.** Wire. Carolina Industrial Plastics Corp., Mount Airy, N. C.

500,863. **"Under Wonder."** Girdles, garter belts, etc. Leading Foundations Co., Inc., New York, N. Y.

500,869. **Ambassador.** Storage batteries. United States Rubber Co., New York, N. Y.

500,870. **President.** Storage batteries. United States Rubber Co., New York, N. Y.

500,871. **Diplomat.** Storage batteries. United States Rubber Co., New York, N. Y.

500,907. **Butterfly.** Dress shields. I. B. Kleinert Rubber Co., Inc., New York, N. Y.

500,949. **Pennsylvania.** Tires, tubes, camelback, etc. Pennsylvania Rubber Co., Jeannette, Pa.

500,953. **Rantos.** Rubber goods preservation dusting powder. Holland-Rantos Co., Inc., New York, N. Y.

500,954. **FloaTread.** Tires. Bassick Co., Bridgeport, Conn.

501,016. **Albatross.** Trusses. Surgical Appliance Industries, Inc., Cincinnati, O.

501,021. **Pedic.** Arch supports. Scholl Mfg. Co., Inc., Chicago, Ill.

501,025. **Rhotex.** Water soluble resinous materials. Rohm & Haas Co., Philadelphia, Pa.

501,026. **B V S.** Stabilizers. Baker Castor Oil Co., Bayonne, N. J.

501,039. **Figur-matic.** Foundation garments. American Lady Corset Co., Detroit, Mich.

501,053. **Bretelles "La Fayette."** Suspenders. Pioneer Suspender Co., Philadelphia, Pa.

501,063. **The Club.** Garters, belts, and suspenders. Knothe Bros. Co., Inc., New York, N. Y.

501,064. **Expanso.** Suspenders and garters. Knothe Bros. Co., Inc., New York, N. Y.

501,065. **Old Hundred.** Garters and suspenders. Knothe Bros. Co., Inc., New York, N. Y.

501,079. Representation of a duck and the word: **"Duxbak."** Adhesive belt-cement. C. A. Schieren Co., New York, N. Y.

501,121. **Hipmold.** Foundation garments. Youthcraft Creations, Inc., New York, N. Y.

501,122. Representation of a heart containing the words: **"Teen Mates."** Foundation garments. Youthcraft Creations, Inc., New York, N. Y.

501,126. Representation of a circle containing the letters: **"KS,"** and between the words: **"Multi-Rib Implement."** Tires. Kelly-Springfield Tire Co., Cumberland, Md.

501,127. Representation of a label containing the word: **"Pliflex."** Tubing. Platka Export Inc., Fort Wayne, Ind.

501,137. **T-56.** Model aircraft tapes or thread. United States Rubber Co., New York, N. Y.

501,147. **Ultron.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

501,169. **Handy Home.** Coated abrasive products having a flexible backing. Armour & Co., Chicago, Ill.

501,177. **Omar.** Rubber pencils, erasers, rubber bands, etc. A. W. Faber-Castell Pencil Co., Inc., Newark, N. J.

501,189. **Belden.** Electrical wires, cables, and cordage. Belden Mfg. Co., Chicago, Ill.

501,197. **Claybrooke.** Footwear. Meier & Frank Co., Inc., doing business as Meier & Frank Co., Portland, Oreg.

501,200. **Trem.** Emulsifiers and wetting agents. Griffin Chemical Co., San Francisco, Calif.

501,212. **Alluron.** Window curtains and drapes. I. B. Kleinert Rubber Co., Inc., New York, N. Y.

501,227. **Oroglas.** Synthetic resinous materials. Rohm & Hass Co., Philadelphia, Pa.

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SALES REPRESENTATIVES AND WAREHOUSE STOCKS:

Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass., • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto.

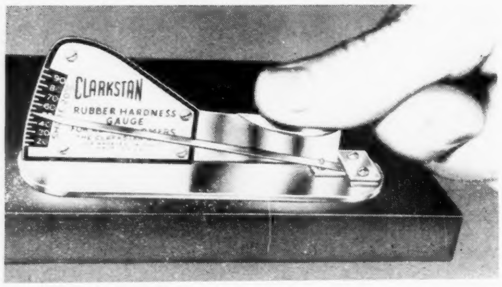
AMERICAN *Cyanamid* COMPANY

CALCO CHEMICAL DIVISION

RUBBER CHEMICALS DEPARTMENT

BOUND BROOK, NEW JERSEY

New Machines and Appliances



New Clarkstan Rubber Hardness Gage

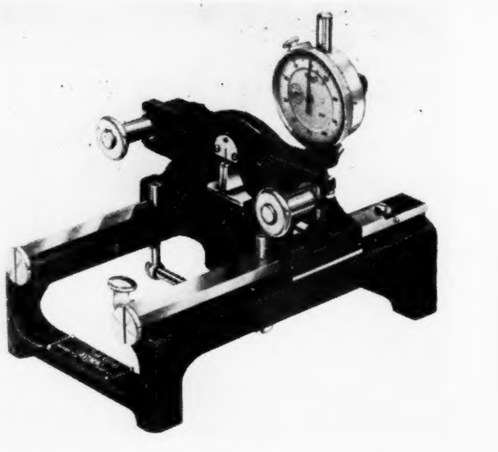
Hardness Gage for Elastomers

A NEW, low-cost, accurate rubber gage which measures the hardness of rubbers and other elastomers in the 15-95 Shore range has been announced by Clarkstan Corp., Los Angeles, Calif. Of convenient size, the gage may be carried in the pocket. The instrument has a hard, polished chromium finish, and each unit is supplied with a test block of known Shore hardness. The gage is said to be accurate and consistent since it has only one moving part without linkage. The scale is positioned to permit easy reading, and no complicated set-up is necessary to use the gage. In operation, the gage is pressed against the sample being measured and the hardness read directly on the scale.

Tear Sample Cutter

THE usefulness of a tear resistance test on rubber sheeting will depend on the care with which samples are prepared and, in particular, on the accuracy with which the tear nick is measured. A cutter designed by Imperial Chemical Industries, Ltd., and now produced commercially by Avimo, Ltd., Taunton, Somerset, England, overcomes the difficulty of cutting accurately an 0.02-inch nick in tear test samples. An accuracy test carried out on 72 test pieces of two-millimeter thick rubber sheeting gave a standard deviation of 0.0013-inch in the depth of the nick, with a tolerance value of $\pm$ 0.003 inch.

The cutter consists of a heavy cast base with machined guide rails along which the sample carriage travels. The rubber sample is clamped in the carriage by means of two spring loaded disks. A razor blade is held firmly in a clamp, and when the sample carriage is moved along the rails, the edge of the blade enters a narrow slot in the carriage and cuts the rubber. The height



Avimo Cutter for Nicking Tear Test Specimens

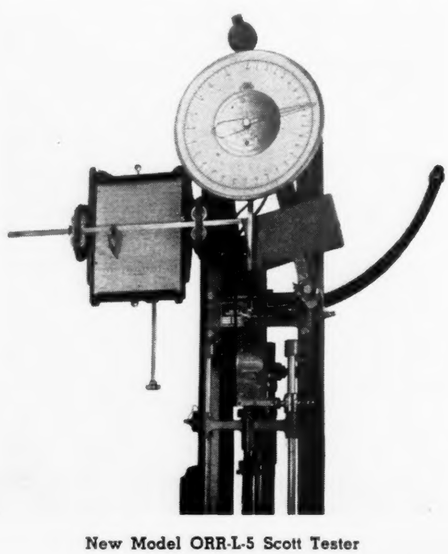
of the clamp which holds the razor blade is controlled by an adjustable screw stop whose movement is measured by a dial micrometer reading in 0.001-inch. A simple lever raises the razor clamp against its stop and at the same time lowers two stops on the guide rails to permit the carriage to slide over the razor blade. The lever insures that no cutting can take place until the blade is in position. In operation, the nick is measured with a microscope, and the error taken up on the micrometer.

Improved Scott Tensile Tester

A NEW Model ORR-L-5 tensile tester for rubber and other high elongation materials has been announced by Scott Testers, Inc., Providence, R. I. The tester is a highly precise instrument combining all the features of the standard Model L-5 with special additions developed with the cooperation of the Subcommittee on Test Methods, Office of Rubber Reserve, and the National Bureau of Standards.

The head of the new tester is of the inclination balance type with one adjustable resistance weight compensating for specimen thickness over a narrower range than provided by the Model L-5. A second vernier adjustment is incorporated into the pendulum to compensate for the width of the specimen as cut by a standard die, thus eliminating this variable influence. Another feature is an electrical solenoid for disengaging the pawls from the quadrant during the test and actuated by the tension of the sample. Release of tension upon rupture of the sample engages

(*Continued on page* 136)



New Model ORR-L-5 Scott Tester

EUROPE

GERMANY

Rubber Imports into Western Germany

Imports of rubber into Western Germany during the year ending June 30, 1949, now are planned to include 60,000 tons of natural rubber and 7,000 tons of synthetic, according to the American Consulate at Frankfort, the Rubber Division, United States Office of Domestic Commerce, announced September 16. Originally German imports of natural rubber for 1948 were scheduled at 34,800 tons, but actual contracts in the first six months called for 28,050 tons, the greater part of which was delivered during that period. Natural rubber imports for the last half of 1948 now are scheduled at 17,210 tons per quarter.

The import program is dependent on financing by the Economic Cooperation Administration and other American sources, since exchange would not be available otherwise. Some cycle tires and general rubber goods, but no automobile tires, are exported from Germany, and German foreign trade as a whole shows a large import balance.

Automobile tire requirements in Western Germany for 1948 originally were estimated at 2,500,000 units. This figure has been reduced to 2,304,000, or 192,000 a month. Domestic production, expected to average 123,000 a month, reached an average of 131,000 monthly in the second quarter. In July, 186,000 tires were turned out. Germany thus is becoming rapidly self-sufficient in tires, and imports will be much lower than the $7,000,000 worth originally planned for the current calendar year.

German production of synthetic rubber ceased July 1 in accordance with the Potsdam Agreement, and the 7,000 tons to be imported are expected to come from the United States.

Buna Manufacture at Huls Works

Reports from the Huls Chemical Works give details concerning the manufacture of Buna and plans for future operations in light of existing circumstances. The company, established in 1938 for the production of Buna by the I. G. Farbenindustrie A. G., Frankfurt a.M., and the Hibernia Herne Mining Co., reported its first outputs of Buna in 1940. The process utilized as basic material hydrogenation gases from the synthetic gasoline works Scholven and Gelsenburg, or natural gas from the Bentheim area, which were conveyed to the factory by pipelines 200 kilometers long. These gases were converted into acetylene by electric arc, this in turn to acetaldehyde, from which acetaldol was obtained by reaction with alkali. The aldol was hydrogenated under 300 atmospheres' pressure to yield butylene glycol, from which butadiene was obtained by catalytic dehydration.

Besides acetylene the electric arc treatment also gave ethylene from which, by a separate process, the styrol was obtained which served to produce Buna S by emulsion polymerization with the butadiene, obtained in the first process.

In 1944 the Huls works had a productive capacity of about 40,000 tons of Buna, besides about 1,500 tons of synthetic resins. After the war Buna output was limited chiefly by lack of hydrogenation gases as a result of the cessation of operations at the synthetic gasoline works, and the management decided to turn to the production of other materials with the equipment thus freed. In the first half of 1947, total outputs included 47.2% of Buna and softeners, 8.9% of solvents and synthetic resins, and the balance, other organic and inorganic products.

Since then the company, realizing the uncertain prospects of Buna, is understood, with the approval of the proper authorities, to have changed over progressively to the manufacture of an increasing quantity of other products so as to be in a position to continue operating economically even after all production of Buna has ceased.

Economics of Buna Production

The technology and economics involved in the three industrial processes for manufacturing Buna in Germany formed the subject of a paper read by A. Haehl at the Maison de Chimie, in March, 1948[1]. M. Haehl, now with the Societe Francolor,

[1] *Rev. gén. caoutchouc,* 25, 7, 268 (1948).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was formerly with the Ludwigshafen works of I. G. Farbenindustrie, A. G., and in his paper he compares the processes used at Schkopau, Huls, and Ludwigshafen.

In considering the processes from the economical point of view, he shows that the Schkopau process, at least in 1944, was the cheapest, primarily because it was the oldest (it dates from 1935) and most familiar; the output of Buna was on the largest scale, and the factory was not exposed to severe bombings during the war; but it yielded comparatively few interesting by-products. Although the Huls process was initiated during the war, it was but little more expensive than that used at Schkopau, chiefly because of the number of valuable by-products it yielded, chief among which is di-acetylene. This substance, having two conjugated triple bonds, reacts at low temperature and without pressure with alcohols, mercaptans, aldehydes, ketones, and diamines, yielding plastics, plasticizers, drying oils, insecticides, etc.

The Ludwigshafen process was the latest; the factory, started early in 1944, of the three factories was the most subjected to bombings during the war. For these reasons and also because output was still comparatively low, the cost of production here was far higher than at Schkopau or Huls. Mr. Haehl, however, states that the process used there has given rise to a whole new chemistry, furnishing a number of products, many of which are more profitable than Buna, so that the latter is practically a secondary product. The process yields six valuable intermediate products: propargylic acid, butenediol, butinediol, butanediol gamma butyrolactone (obtained by dehydrogenation from butanediol), and tetrahydrofurane.

Dismantling I.G. Chemical Plants in Soviet Zone

In a survey of the dismantling of plants in various industries in the Soviet Zone of Germany, appearing in *Angewandte Chemie*,[1] details are given regarding the situation at some of the factories formerly owned by the I. G. Farbenindustrie and now in posession of Soviet Corporations (indicated by the initials SAG).

The works now known as SAG "Mineraldunger" (mineral fertilizer) at Leuna had suffered serious damage during the war; nevertheless equipment accounting for 50% of the remaining productive capacity has been removed by Soviet authorities. Among the materials produced here during the war were methanol and higher alcohols, total production of which amounted to 200,000 tons. The methanol and several by-products are still for the most part sent as base materials to the Schkopau and Bitterfeld Works, both also once owned by I. G. Farben. A saltpeter installation is expected to be restored since a chemist at the Leuna works is said to have developed a valuable new synthetic fiber requiring the use of saltpeter. The production of methylamine will continue, and also of lactams on a phenol basis, since lactams are valuable intermediate products in the manufacture of synthetic fibers (similar to nylons).

Productive capacity at the SAG "Kaustik," Bitterfeld, suffers not only from the dismantling of plant for producing chemicals but by the wholesale removal of plant from the Thalheim power station built during the war, and of important parts from the large, old Bitterfeld-Sud power station.

At Bitterfeld the entire magnesium plant was taken away, and dismantling of plant in other divisions was more or less extensive, resulting in the case of Igelit, for instance, in a cut of about 14,000 tons in the annual productive capacity, formerly said to have been about 18,000 tons. The capacity of installations for making plasticizers, chiefly tricresylphosphate, has been reduced by about 50%.

At the SAG "Kautschuk," Schkopau, no dismantling had taken place until the early part of 1948 when it was decided to remove about two-thirds of the plant for making Buna. The immense carbide installation, including eight large furnaces, has as yet not been touched. The present capacity of the above works for producing Buna and other products is stated to be:

	Tons per Annum
Carbide	300,000
Buna	20,000
Igelit PCU (polyvinylchloride)	7,200
Polystyrol	400
Ethylene oxide	9,000
Butanol	3,600
Trichloroethylene	3,000
Methylacetate, Ethylacetate, Butylacetate	8,000
Acetone	2,400
Acetic acid	14,000
Formaldehyde	29,000
Phthalic acid anhydride	3,000
Chlorine	33,000
Soda lye	36,000
Aluminum chloride	7,000
Lubricant	3,500

[1] 20, 5/6, 148 (1948).

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MONSANTO CHEMICALS AND PLASTICS

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The Piesterits works of the SAG "Celluloid" suffered 80-85% dismantling, it is said. Apparently calcium carbide is the chief product here; annual output is put at 44,000 tons; the works further produce 14,000 tons of carbon black annually, about three-fourths of the former capacity.

Hannover Export Fair

The rubber industry was adequately represented at the 1948 Hannover Export Fair once it was realized that instead of having a section to itself, rubber goods had to be looked for in the divisions devoted to automobiles and accessories, the electrical industry, and the chemical and the machinery industries.

Continental A.G., Hannover, showed surgical, sanitary, and sporting goods, heels and soles, storage batteries and repair materials, besides tires. Chiefly as a result of the shortage of labor, the company is working at only 45% of capacity.

The Getefo concern, which here pioneered in the production of rubber-to-metal vibration absorbers, had on view a number of its specialties including the patented Gimetall, which is again being produced by a number of firms in different parts of Germany operating under Getefo licence. Among the articles shown were rubber heels made from a new material called Novogi. These heels are shortly to be put on the market more or less as trial samples, and eventually the material is to be used in the manufacture of vibration-absorbing devices.

The I. G. Farbenindustrie A.G. (in liquidation) was represented only by posters. Output by the concern of various chemicals and ingredients for the rubber industry is said to be inadequate to meet both home and export demands, particularly in view of the change-over to natural rubber.

The New York Harburger Gummiwaren Co., Hamburg, displayed a good assortment of its hard rubber specialties, chiefly for the chemical industries.

The considerable progress in postwar production by the Harburger Gummiwarenfabrik Phoenix, A.G., Harburg, was evidenced by its showing of bathing caps and slippers, sanitary wares, galoshes, waders, tennis shoes, mechanical goods, and giant pneumatic tires. The firm hopes before long to be able to put on the market also surgical hollow goods and hose.

The Rhienishe Gummi-und Celluloidwaren-Fabrik, Mannheim-Neckarau, now able to operate at 50-60% of former capacity, had a good range of its toys and combs as well as profiled rubber goods and reinforced hose on view.

An attractive display was achieved by H. Rost & Co., Hamburg, with its sheets of colored plastic material for protective garments and the like; a new product was a rubber and cotton driving belt. This company recently celebrated the one hundredth year of its foundation. It is the manufacturer since 1936 of the gutta percha substitute known as Guttasyn.

Siemens & Halske and Siemens-Schukertwerke, A.G., have developed a semi-conducting rubber for cables for use in holing work in mines, for which Buna is indispensable.

A new tread said to insure almost 100% dissipation of heat was featured by the Veith Gummiwerke, A. G. The company suffered no war damage and works to capacity again.

Rubber machinery was shown by Werner & Pfleiderer and Hans Kock. Dreyer, Rosenkranz & Droop, A.G., featured a deformation measuring device for synthetic and natural rubber, reclaim and plastics.

Plastics at the Leipzig Spring Fair

Among the new plastic goods shown at the Leipzig Spring Fair, 1948, was reported a material said to consist of human hair bonded with Igelit, the German polyvinylchloride. It seems to have been used for ladies' shoes as well as for sandals for men and children, all stated to be available in various colors and attractive. Soles and heels also were said to be made of this material.

Another novelty was a waterproof, leather-like fabric coated with Igelit, suitable for different purposes including the manufacture of footwear; then there were knee-high ladies' gaiters of "Perfol," a clear, transparent material, adjustable for all sizes and designed to protect the stockings in bad weather and at the same time keep the feet warm, and "Perlon" synthetic cords for stringing rackets and musical instruments.

At the medical conference held during the fair, the possibilities of plastics for artificial limbs, in dentures, and even in the form of artificial noses and ears, were discussed. One of the speakers described an artificial hand made of Igelit, which was claimed to be flexible, washable, and so successfully tinted that it looked like a normal hand and did away with the need

of the customary glove. Finally mention was made of experiments to test the use of Igelit as material for making arch supports.

Plastics in the Soviet Zone

A recent review of the plastics industry in the Soviet Zone reveals that shortages of coal and cellulose are hampering resumption and further development of operations. To some extent, however, the increasing output of lignite (brown coal) has made the zone less dependent on ordinary coal.

Phenol seems the most readily available material for making condensation products so that there is a fairly adequate supply of phenol resins, and there also appears to be a fair amount of formaldehyde. Urea and melamine resins have largely been replaced by a dicyanodiamide resin, used chiefly in adhesives. Materials for making lacquers, as phthalic acid anhydride, colophony and vegetable oils, are short, and only phenol-based lacquers are in adequate supply. Both hard and soft polyvinylchloride resins are available, also some types of polystyrol, but acrylic resins cannot be produced.

GREAT BRITAIN

Imports and Consumption of Rubber

In the first half of 1948, the United Kingdom imported 112,667 tons of natural rubber, of which 10,103 tons were reexported; in the same period total imports of synthetic rubber came to 1,258 tons.

Consumption of new rubber included 98,615 tons of natural rubber, of which 5,177 tons were in the form of latex in addition to 1,364 tons of synthetic rubber, chiefly neoprene. The total consumption of rubber for the six months, at 99,979, compares with 70,542 tons in the first half of 1947 and 156,399 tons for the whole of 1947. As the previous peak was 156,549 tons in 1941, it seems safe to assume that consumption for all of 1948 will set a new record.

Carbon Black Industry Developing

The carbon black factory of the Palatine Development Co., will be erected on a 20-acre site at Avonmouth, Bristol. Work on the factory, expected to cost £1,000,000, is to start before the year-end.

In a discussion of the latest developments in the manufacture of carbon blacks in England, *The Rubber Age and Synthetics*[1] calls attention to a rival project to the new Palatine undertaking. It seems that on June 11, 1948, Lord Brocket, chairman of United Kingdom Chemicals Ltd., inaugurated at the Port Tennant Works, Swansea, Wales, a plant which utilizes

[1] Aug. 1948, p. 218.

"Radenthein" electric furnaces in the cracking of oils for making carbon blacks. These furnaces, originally built after Austrian design for manufacture of magnesium metal and subsequently closed by the government when it was found cheaper to import magnesium from the United States, have been converted by technicians of United Kingdom Chemicals to serve in the production of carbon black. Production has already started, it is said, with imported petroleums as the basic materials, although it is expected to use oil from Scottish coal before long.

United Carbon Black, Ltd., has been formed with a capital of £125,000 to manufacture chemical and allied products, to treat coal and other minerals and their derivatives, and tar and other products.

Rubber Industry Notes

Rubber Roadways, Ltd., held its thirty-third annual meeting in London, July 26, when it was revealed that since the war had sidetracked any latent demand for rubber-capped roadblocks, there are at present no facilities for large-scale manufacture of such blocks. The company has informed authorities of this fact, stressing the need of timely advice of any proposed projects involving the use of rubber blocks, since delays in securing plant and machinery would inevitably follow if an insistent demand developed before manufacturing facilities had been reestablished.

The Kenward Trust set up in memory of the late Sir Harold Kenward announces that a Fellowship in Industrial Administration has now been established at St. Catherine's College, Cambridge, with F. W. Mulley the first holder.

Amalgamated Rubber Moldings, Ltd., Manchester, has just gone into voluntary liquidation. The company was registered on January 17, 1948, with nominal capital of £10,000 to manufacture rubber dolls, shoes, bathing caps, etc.

Impact Resistant Resin-Rubber

(Continued from page 68)

practical, the stock can be rebroken down when desired for use.

Summary and Conclusions

Resin-type stocks exhibiting excellent impact resistance can be prepared by plasticizing high styrene copolymer resins with natural rubber or synthetic polymers.

These impact resistant blends can be compounded with a wide range of filler, reinforcing, or color pigments to produce high impact resistant stocks in a wide range of specific gravity, color, and compound cost.

As the high styrene resins are light colored, nondiscoloring resins of low specific gravity (1.05) make possible the compounding of lightweight stocks (in a wide range of colors) having excellent impact resistance.

The impact blends can be processed on conventional rubber mixing and curing equipment. The thermoplasticity of the resin aids in the milling and molding of these stocks.

The unique properties of the resin-rubber blend of polishing to a fine gloss finish and machining on conventional woodworking or metal working machinery increases the usefulness of the stock.

The field for application of these-type stocks presents many opportunities.

The authors wish to acknowledge the aid of R. D. Juve, of the Goodyear research laboratories, who did the basic work leading to this development, and are grateful to the Goodyear Tire & Rubber Co. for permission to publish this paper.

Editor's Book Table

BOOK REVIEWS

"The Science of Plastics. Volume I." Edited by H. Mark and E. S. Proskauer. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 6½ by 9¾ inches, 636 pages. Price, $9.

This volume consists of reprints of part of the literature and patent service on "Resins, Rubbers, Plastics," by Mark, Proskauer and V. J. Frilette, which has been issued in looseleaf form since 1942. This is therefore a comprehensive source book on original literature published in the period 1942-1946. Each paper included is presented in the form of a lengthy abstract with all tabulated data, graphs, charts, etc. The abstracts are grouped into sub-sections or chapters which in turn fall under four main sections, as follows: properties and evaluation of plastics; physical chemistry of polymer systems; kinetics of polymerization reactions; and plastic engineering. The papers in this volume are concerned with the more general aspects of the plastic state; papers dealing with studies on individual plastics will appear in Volume II. Comprehensive author and subject indices are appended.

"Modern Colloids. An Introduction to the Physical Chemistry of Large Molecules and Small Particles." Robert B. Dean. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. Cloth, 9 by 6 inches, 312 pages. Price $3.75.

Although elementary in approach, this book gives an up-to-date treatment of colloid science in the light of established chemical principles. These principles, such as the conception of a high polymer as a single molecule, are used to cover all types of colloidal materials and their behavior. In addition to clarity, the effectiveness of the text is further enhanced by the use of numerous illustrations, graphs, charts, etc. Of special interest is the use of drawings based on the Hirshfelder models which show the molecules drawn to an indicated scale. Individual chapters cover the following subjects: introduction and definitions; methods for determining the size and shape of colloid particles; liquid surfaces; adsorption; ionic adsorption; high polymers; resins and rubbers; carbohydrates and proteins; colloidal ions; emulsions and foams; hydrous oxides and silicates; and lyophobic colloids or suspensoids. The presentation is aided by the use of many literature references, a chapter giving problems on the material presented, and an adequate index.

"Industrial Weighing." Douglas M. Considine. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 560 pages. Price, $10.

Written to fill the gap in the literature on scales and weighing, this book should be of wide interest to the process industries and of particular value to all users of scales. The first part of the volume covers scale design, construction, and operation and consists of chapters on fundamentals of scale mechanics; theory of scale operation; scales for basic weighing; printing and counting scales; automatic weighers; design considerations; and selection, installation, and maintenance. The second part is devoted to industrial uses of scales, with individual chapters covering uses in mining, machinery, and metal products; chemical industries; public works, service, and transportation industries; food industries; textile and paper industries; and rubber and plastics industries. The chapter on scales in the rubber industry is of particular interest as it presents a discussion of natural and synthetic rubber production, handling, and processing from the viewpoint of the weighing operations involved. A glossary of scale terms is included together with tables of densities of solid materials and local weight systems, and a subject index.

"Plastics Dictionary." Thomas A. Dickinson. Pitman Publishing Corp., 2 W. 45th St., New York 19, N. Y. Cloth, 6 by 9 inches, 322 pages. Price, $5.

This book is more than just another dictionary of plastics terms. Although it contains complete definitions of some 3,500 of the most common terms used in the plastics industry, the definitions are so written as to be clear and understandable to both plastics expert and layman. Many base words and combining forms are given to enable the reader to understand many uncommon terms that may not be defined. Comprehension is also aided by the use of drawings to illustrate the exact meaning of certain terms. Besides definitions there are tables and charts providing data on

catalysts, chemical elements, fillers, pigments, plasticizers, solvents, and other products. Further value is gained by the inclusion of both chemical and trade named materials, a comprehensive selection of British plastics names and terminology, and a bibliography for further reference.

NEW PUBLICATIONS

"Piccolyte the Versatile Resin." Pennsylvania Industrial Chemical Corp., Clairton, Pa. 8 pages. The properties, advantages, applications, and suggested uses for Piccolyte are described. Photographs illustrate various steps in the manufacture of the resin. Among the uses mentioned is that as a softening and tackifying agent in rubber goods and adhesives.

"Machining and Finishing Lustrex and Lustron." Product Information Bulletin No. 52. Monsanto Chemical Co., Springfield 2, Mass. 8 pages. This bulletin gives detailed information on machining and finishing operations for use on the company's polystyrenes Lustrex and Lustron. Subjects covered include drilling, milling and shaping, threading and tapping, turning, sawing, crimping, printing, painting, bending, grinding, buffing, and annealing, among others.

"Parlon, Hercules Chlorinated Rubber. Properties and Uses." Hercules Powder Co., Wilmington, Del. 44 pages. This revised edition of the company's technical booklet on Parlon contains considerable new information on use of the material in protective coatings, printing inks, paper coatings, and textile finishes, in addition to information on properties of Parlon, compatibility, and other applications.

"How to Get Extra Service out of Automobile Tires." The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y. 32 pages. This booklet illustrates and describes the proper care of automobile tires and the results of each type of tire abuse or misuse. The subject matter is divided into six parts, dealing with various tire wear conditions, as follows: fabric breaks, tread wear, inflation, wheel balance, cuts and repairs, and tubes and tire demounting and mounting. Each of these parts or sections is also available separately.

"Witco #30: A New Softener." Technical Service Report R-6, August 6, 1948. Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8 pages. Extensive laboratory test data on natural rubber and GR-S stocks using Witco #30, a new petroleum base, low-viscosity rubber softener, are presented. Physical properties imparted to vulcanizates by Witco #30 are shown to be equal or superior to those obtained by use of a high-viscosity softener.

"New Resins for Industry: Polyvinyl Acetate Copolymers in Solution Form." Technical Data Sheet P-7. American Polymer Corp., Peabody, Mass. 2 pages. This bulletin describes the four grades of Polyco polyvinyl acetate copolymer solutions and gives information on their properties, compatibility, plasticization, and uses in the manufacture of adhesives, protective coatings, and saturants.

"Indonex Plasticizers in Hycar Gasket and Packing Compound." Circular No. 13-27, August 10, 1948. Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill. 4 pages. The suitability of Indonex plasticizers for Hycar OR-15 compounds used in heat and steam resistant gasket and packings is shown by means of typical formulations and results of tests on vulcanizates.

"Hydraulic Presses." Bulletin 286. Baldwin Locomotive Works, Philadelphia 42, Pa. 12 pages. This bulletin describes, illustrates, and gives specifications for the company's standard and custom built steam platen presses for use in the manufacture of belting, brake lining, drug sundries, gaskets, packings, molded rubber goods, plastic laminates, rubber tile and wallboard, grinding wheels, printing plates and mats, and other products.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"Color in Elastomer Compounds."** Report No. 48-5, July, 1948. A. J. Northam and S. G. Byam. 24 pages. This booklet discusses factors affecting color in elastomers, economic considerations, pigment properties, latex colors, inorganic colors, color terminology, color matching, and related subjects. Included are color charts, a glossary of terms, and a bibliography.

"Vulcanization of Neoprene with Red Lead." BL-227, August 15, 1948. 4 pages. Test data in tabular and chart forms are presented to show that red lead can be substituted directly for litharge as a curing agent for neoprene and results in a marked increase in processing safety and storage stability.

"Water Dispersible Colors for Use in Latex." Report No. 48-6, August, 1948. E. P. Hartsfield and A. H. Woodward. 3 pages. This report covers the use of dispersible colors in elastomer latices, the company's water dispersible colors currently available, and methods for preparing water dispersible colors for use in latex.

"Emmert Drafting Machines." Bulletin No. 6-48. Emmert Mfg. Co., Waynesboro 2, Pa. 6 pages. This bulletin describes and illustrates the company's new stainless steel drafting machines and equipment. These machines provide fast, accurate, full board coverage, true horizontal and vertical adjustments, and fit any drafting board.

"PF Decals." Palm, Fechteler & Co., 220 W. 42nd St., New York 18, N. Y. 16 pages. **"Tests for Truth—Truth *vs.* Myths about Profit."** G. H. Cless, Jr. The Eddy-Rucker-Nickels Co., Cambridge 38, Mass. 28 pages. **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials."** June, 1948. 62 pages. **"List of Inspected Electrical Equipment."** May 1948. 544 pages. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. **"The Structure of Amorphous and Stretched Rubber."** Clarence M. Parrsall, Purdue University, Lafayette, Ind. 91 pages. **"The New Falk Motoreducer."** Bulletin 3101. The Falk Corp., Milwaukee 8, Wis. 4 pages.

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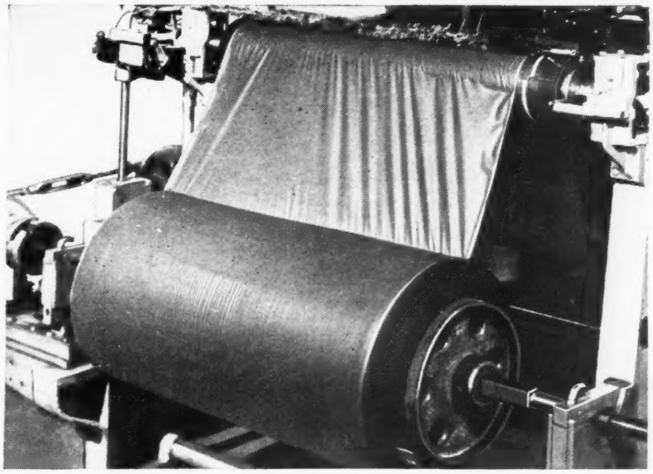

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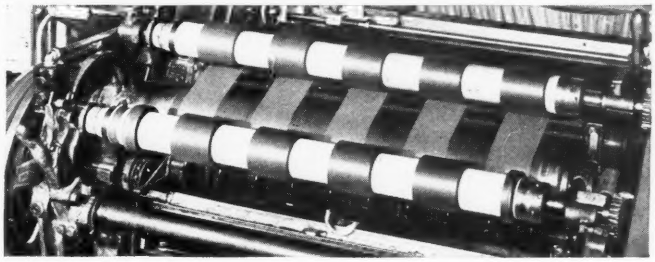

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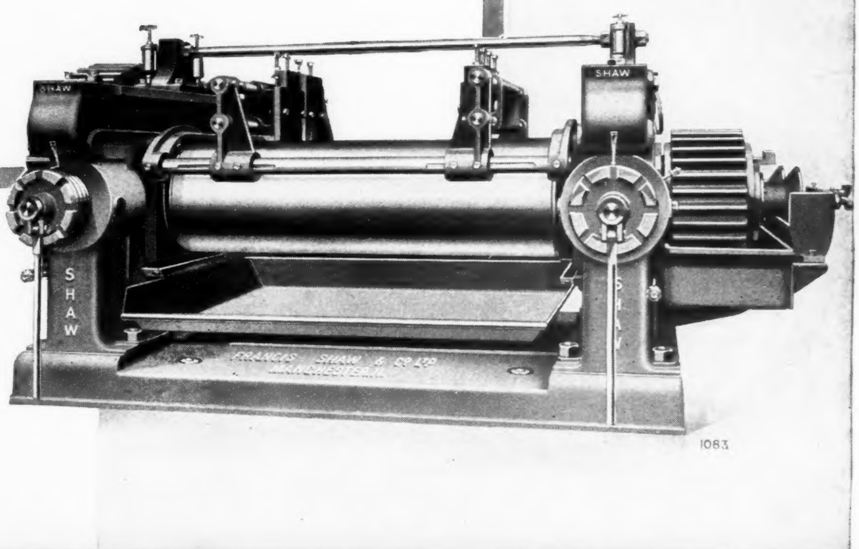

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Market Reviews

CRUDE RUBBER

Commodity Exchange

Week-End Closing Prices

	July 31	Aug. 28	Sept. 4	Sept. 11	Sept. 18	Sept. 25
Sept.	23.00	21.00	21.25	21.50	21.25	21.45
Oct.	23.02	20.97	21.20	21.41	21.28	21.30
Nov.	23.02	20.97	21.16	21.33	21.31	21.30
Dec.	23.05	20.90	21.15	21.25	21.35	21.25
1949						
Jan.	23.00	20.90	21.11	21.20	21.30	21.22
Feb.	22.94	20.90	21.11	21.15	21.25	22.22
Mar.	22.88	20.90	21.10	21.10	21.20	21.26
Apr.	22.80	20.87	21.10	21.07	21.19	21.19
May	22.75	20.85	21.10	21.05	21.18	21.18
June	22.70	20.80	21.65	21.00	21.13	21.13
July	22.65	20.75	21.00	20.95	21.08	21.08
Aug.	22.60	20.70	20.95	20.90	21.03	21.03
Sept.	22.55	20.65	20.90	20.85	20.98	20.98
Oct.	22.50	20.60	20.85	20.80	20.93	20.93
Nov.	....	....	20.80	20.75	20.88	20.88
Weekly sales volume, tons	3,660	3,660	1,420	1,570	980	1,140

RUBBER futures trading on the Commodity Exchange continued quiet and spiritless during September. The lack of activity is shown by the monthly total of 5,640 tons sold, as compared with last month's low total of 12,150 tons, and represents the smallest volume of trading since the reopening of the Exchange.

Despite the market dullness, rubber futures prices held relatively firm with daily irregularities having little effect. September futures opened the month at 21.00¢, rose to a high of 21.75¢ on September 22, and closed at 21.40¢ on September 28, the last day on the board. December futures were 20.80¢ on September 1, reached a high of 21.64¢ on September 22, and closed the month at 21.40¢. March futures started at 20.65¢, hit a high of 21.48¢ on September 20, and ended the month at 21.25¢.

A feature of the market was its lack of response to foreign physical market price movements and to reports affecting the rubber situation. Among such reports were word from Germany that imports of rubber into the Western Zones for the year ending June 30, 1949, are now planned to include 60,000 tons of natural rubber and 7,000 tons of synthetic rubber; the announcement from ECA that it had received its first dividend under ERP in the form of 25,000 tons of rubber from England for the stockpile; the announcement that world production of natural rubber during the first seven months of 1948 had exceeded consumption by 77,500 tons; and reports of continuing disorders in Malaya.

A new rubber futures contract against which delivery of only one grade, No. 1 R.S.S., will be permitted was approved by the membership of the Exchange on September 15. Trading in the new contract will begin October 11, with March, 1949, as the first delivery month. Trading will be conducted in contracts for delivery during the current month and the 14 succeeding calendar months, except at the beginning of trading on October 11, when the board will include only March, 1949, and the nine succeeding months. The existing rubber futures contract, trading in which is to be continued, calls for delivery of any of four different grades of natural rubber with discounts for grades inferior to No. 1 R.S.S. The trading unit in both contracts is 10 long tons, with quotations in 1/100¢ a pound.

Balloting by the membership also approved changes in the Exchange's by-laws lowering commission rates in rubber futures trading and establishing "day trades" in the market.

New York Outside Market

Week-End Closing Prices

	July 31	Aug. 28	Sept. 4	Sept. 11	Sept. 18	Sept. 25
No. 1 R.S.S.:						
Sept.	24.75	22.75	23.00	22.88	22.88	22.63
Oct.	24.75	22.75	22.88	22.88	22.75	22.50
Nov.-Dec.	24.75	22.63	22.50	22.75	22.63	22.38
Jan.-Mar.	24.25	22.38	22.13	22.38	22.38	22.25
Apr.-June	23.63	21.75	21.88	22.00	22.13	22.00
No. 3 R.S.S.	22.25	20.00	20.38	20.75	21.00	20.75
No. 2 Brown	18.38	17.00	16.75	17.00	16.75	16.50
Flat Bark	12.25	11.50	11.25	11.25	11.50	11.38

TRADING in rubber on the New York Outside Market was fairly light during September, and prices moved slightly downward in view of heavy offerings and only moderate demand. No. 1 R.S.S. spot price was 23.00¢ on September 1, hovered between 22.75¢ and 23.00¢ during most of the month, and closed the month at 22.75¢. No. 3 R.S.S. started the month at 20.25¢, reached a high of 21.00¢ on September 16, fluctuated, then ended the month at 21.00¢. No. 2 Brown hovered between 16.63¢ and 17.00¢ during the month, and Flat Bark fluctuated irregularly in the 11.25-11.63¢ range.

Reports from Malaya state that stocks of natural rubber in the Malayan Union and Singapore at the end of August declined to 138,617 long tons from 145,019 long tons at the end of July. This level is the lowest of Malayan stocks since the end of last February. Rubber production in Malaya in August amounted to 56,602 long tons; while imports by the Union were 2,839 long tons. Union exports, exclusive of Singapore, totaled 64,155 long tons in August, of which 10,869 long tons went to the United States; 10,153 to United Kingdom; 8,935 to Soviet Russia; 1,644 to Japan; 1,604 to France; and 1,571 to Canada. Malayan shipments to Singapore were 24,213 long tons.

Latices

CONSUMPTION of *Hevea and* GR-S latices, after declining somewhat with the usual summer slack period, appears likely to improve as several auto manufacturers are planning to use foam topping, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's September *Rubber Report*. Mr. Nolan gives July *Hevea* latex imports as 3,654 long tons, dry weight; consumption, 1,748 long tons; and month-end stocks, 11,318. August production of GR-S latex is given as 1,339 long tons, dry weight.

Production and shipments of *Hevea* latex from Malaya and Sumatra continue at high levels, with about 4,000 tons exported in both June and July and with more than 60% shipped to this country. Shipments of amonia and creaming agents are ample in Malaya, according to Mr. Nolan, and no difficulties are expected in the supply of these materials. With the installation, probably in mid-1949, of the equipment on order, Malaya alone should be in a position to supply the entire world with its latex requirements, even at a rate higher than optimistic estimates of world consumption. Now that the rubber estates have become more accessible, Sumatra will probably begin latex production on a prewar scale.

No changes in *Hevea* or synthetic rubber latex prices took place during the month. With natural rubber now selling at about 22-23¢, natural latex is priced at about 5¢ higher, and its premium over dry rubber has therefore widened.

Fixed Government Prices*

Guayule

Guayule *(carload lots)*	$0.17½

Latex†

Hevea, normal *(tank car lots)*	.30¾
Centrifuged *(tank car lots)*	.32½
GR-S, Type 2 *(tank car lots)*	.18½‡
(Carload, drums)	.268
(Less carload, drums)	.273
Types 3 and 4 *(tank car lots)*	.18½‡
(Carload, drums)	.26
(Less carload, drums)	.26½
Type 5 *(tank car lots)*	.20¼‡
(Carload, drums)	.27¾
(Less carload, drums)	.27¾

Plantation Grades

No. 1X Ribbed Smoked Sheets	.23
1X Thick Pale Latex Crepe	.29
1 Thick Pale Latex Crepe	.29
2 Thick Pale Latex Crepe	.28½
3 Thick Pale Latex Crepe	28¾
1X Thin Pale Latex Crepe	.29
1 Thin Pale Latex Crepe	.29
2 Thin Pale Latex Crepe	.28½
3 Thin Pale Latex Crepe	.28¼
Liberian A	.28⅝
AA	.29
RCMA Watermarked Crepe No. 16	.37⅞
17	.32⅜
18	.30⅞
Sole Crepe Trimmings	.28½
No. 1X Thin Pale Latex Crepe Trimmings	.28½
1X Brown Crepe	.21⅞
2X Brown Crepe	.21⅝
2 Remilled Blankets (Amber)	.21¾
3 Remilled Blankets (Amber)	.21⅝
Rolled Brown	.185

Synthetic Rubber

GR-M (Neoprene GN)	.32
GR-M-10 (Neoprene GN-A)	.32
GR-S (Buna S)	.18½
GR-I (Butyl)	.18½

Wild Rubber

Upriver Coarse (crude)	.12⅝
(Washed and dried)	.20¼
Islands Fine (crude)	.14⅝
(Washed and dried)	.22½
Caucho Ball (crude)	.11⅝
(Washed and dried)	.19½
Mangabiera (crude)	.08½
(Washed and dried)	.18

* For a complete list of all grades of dry rubbers see Rubber Reserve Co. General Sales and Distribution Circular, July 1, 1945, as amended.
† Prices per pound total solids.
§ Plus average freight charge of 0.75¢ per pound dry weight.

RECLAIMED RUBBER

THE reclaimed rubber market showed improved demand during September, corresponding with the fall pick-up in rubber industry production. As a result, production of reclaim was at high levels, and prices for some basic reclaim grades showed increases of 0.5¢. Affected by this price increase were whole tire, peel, and black and red tube reclaims. The current prices for basic reclaims are listed below.

Final June, first half year 1948, and preliminary July statistics on the domestic reclaimed rubber industry are now avail-

able. Production of reclaim during June totaled 22,504 long tons; consumption, 23,-786 long tons; exports, 927 long tons; and month-end stocks, 35,898 long tons. Reclaim figures for the first six months of the year follow: production, 138,750 long tons; consumption, 140,704 long tons; exports, 5,900 long tons; and stocks, 35,898 long tons. Preliminary statistics for July show a production of 17,723 long tons; consumption, 19,367 long tons; exports, 712 long tons; and end-of-month stocks, 34,175 long tons.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.5 / 9
Peel	1.18-1.20	8.5 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.75
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

THE desultory tone of the scrap rubber market finally resulted in some price decreases in the East during September. Mixed auto tires fell from $12 to $11.50 per net ton; black passenger tubes dropped from 5.0 to 4.5¢ per pound; and black truck tubes declined from 4.75 to 4.0¢ per pound. On the other hand, red passenger tubes rose from 6.75 to 7.0¢ per pound in the East to correspond with the Akron price. Mixed auto tire prices also fell from $13 to $12.50 per net ton at Akron. Other scrap prices remained unchanged in the face of lethargic demand from the reclaiming mills.

Export business was satisfactory during the month, with a slight improvement in demand noted over August, particularly from the Far East. There were reports that the Japanese Board of Trade has contracted for 4,000 tons of scrap rubber. It was said that No. 1 peelings sold at $85 per ton, c.i.f. Japanese ports, including both natural and synthetic rubber. No. 2 peelings were said to have been priced at $60 for both natural and synthetic. Red tubes brought 8.5¢ per pound, and black natural rubber tubes sold at 7 3/8¢ per pound, it was said. It was also reported that some GR-S and Butyl tubes were disposed of at 4 3/8¢ per pound.

The scrap export business still faces difficulties because of European dollar and import license problems. American would-be shippers to Japan encounter the need of representatives there.

Following are dealers' buying prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$11.50	$12.50
S.A.G passenger (natural)	nom.	nom.
Truck (natural)	nom	nom.
Peelings (natural), No. 1	50.00	50.00
2	31.00	31.00
3	29.00	29.00
	(¢ per Lb.)	
Mixed auto tubes	4.00	4.00
Red passenger tubes	7.00	7.00
Black passenger tubes	4.50	5.00
Truck tubes	4.00	4.75
Mixed puncture-proof tubes	0.50	0.50
Air brake hose	nom	nom.

COTTON AND FABRICS

New York Cotton Exchange
Week-End Closing Prices

Futures	July 31	Aug. 28	Sept. 4	Sept. 11	Sept. 18	Sept. 25
Oct.	32.07	30.71	30.94	31.20	31.38	31.39
Dec.	32.03	30.71	30.83	30.94	31.06	30.89
1949						
Mar.	32.02	30.67	30.63	30.75	30.88	30.64
May	31.88	30.45	30.35	30.57	30.67	30.41
July	31.42	30.05	29.22	29.45	29.90	29.67
Oct.	29.52	26.91	26.66	26.80	27.51	27.68

COTTON prices were firmer on the New York Cotton Exchange during September despite daily irregularities. The decline of the previous month appeared to have definitely ended, and an improved tone was noted despite relatively quiet trading. Market improvement was due mainly to short covering in anticipation of heavy loan entries, the high level of cotton consumption during August, and reports of a cotton holding movement by southern growers.

The 15/16-inch middling spot price was 31.90¢ on September 1, rose irregularly to a high of 32.40¢ on September 16, and closed the month at 32.12¢. Futures prices showed the same movement, but in a narrower range. October futures began the month at 30.97¢, reached a high of 31.53¢ on September 16, and closed the month at 31.52¢.

The second crop estimate issued by the United States Department of Agriculture on September 9 forecast a bumper 15,-219,000-bale crop, valued at about $2,785,-000,000. Such a dollar return would be the largest on record, and a half billion dollars more than last year. The new estimate was 50,000 bales higher than the first prediction made during August and compares with the 11,851,000 bales produced last year. Yield per acre, computed at 313.2 pounds of lint, also promised to set a new record this year.

Fabrics

Industrial cotton gray goods prices declined during September in the face of lethargic demand. As a result of the price decreases, sales showed a brisk improvement, and the price picture is believed to be stable for the next few months. Chafers were sold to the rubber industry for October and November deliveries, with the rubber trade taking moderate quantities in a continuation of its conservative buying policy. Hose and belting ducks made a comeback after a long period of listlessness and sold in moderate quantities at 66.5¢. Wide and sail ducks continued to be quoted at 41.5% off the list price.

Drill prices underwent sharp declines, and a continuing market weakness indicated further adjustments may develop. The 59-inch 1.85-yard drill sold at 40¢, a reduction of 2¢ from the August price, and other constructions were offered at prices down as much as 4¢ from previous quotations. Print cloths were not in great demand, and the 39-inch 68 x 72 4.75-yard print cloth was priced at approximately 18.75¢ for nearby delivery. Sateens moved fairly briskly, with most purchases being made by the upholstery and the coating industries. Prices were firm in most cases, and nearby deliveries were in demand. Numbered ducks showed renewed activity after undergoing a price decrease, with the 40-inch 1.45 single filling duck quoted at 45 3/8¢ a yard, a decrease of 0.75¢. As for raincoat fabrics, 38.5-inch 64x60 5.35 print cloth sold at 16.5¢, a decline of 1¢ from previous levels, and the 64x60 5.35 finished bombazine decreased 2¢ to 25.5¢.

RAYON

TOTAL domestic shipments of rayon during August amounted to 93,200,000 pounds, 1% below the July level; while deliveries during the first eight months of 1948 were 726,600,000 pounds, 18% above the 1947 figure. Filament yarn shipments in August totaled 71,400,000 pounds, consisting of 46,800,000 pounds of viscose and cupra and 24,600,000 pounds of acetate. Staple and tow deliveries reached 21,800,-000 pounds.

Domestic shipments of rayon filament for the first eight months of this year totaled 549,100,000 pounds, comprising 363,-100,000 pounds of viscose and cupra (7% above the 1947 level) and 186,000,000 pounds of acetate (35% above the 1947 level). Total rayon stocks in producers' hands at the end of August amounted to 15,200,000 pounds, of which 7,100,000 pounds were viscose and cupra yarn, 3,-400,000 pounds, acetate yarn, and 4,700,000 pounds, rayon staple.

No further changes were made in rayon tire yarn and fabric prices since those in August. Current prices are listed below.

Rayon Fabrics

Tire Yarns			
1100/480	$0.55	/	$0.56
1100/490	.57		
1150/490	.57		
1650/720	.54	/	.56
1650/980	.56		
1900/980	.56		
2200/960	.55		
2200/980	.55		
Tire Fabrics:			
1100/490/2	.71		
1650/980/2	.685	/	.70
2200/980/2	.67		

TRADE MARKS

(Continued from page 102)

501,274. **Coal-Flo.** Belts and belting. Goodyear Tire & Rubber Co., Akron, O.

501,280. The words: **"Hi-Rib Tractor"** and a representation of a circle containing the letters: **"KS."** Tires. Kelly-Springfield Tire Co., Cumberland, Md.

501,281. The words: **"Lug Trac"** and a representation of a circle containing the letters: **"KS."** Tires. Kelly-Springfield Tire Co., Cumberland, Md.

501,282. **Double Weld Hose.** Hose. Thermoid Co., Trenton, N. J.

501,324. **Blackwing.** Rubber packing and hose. Goodyear Tire & Rubber Co., Akron, O.

501,325. **Armadillo.** Rubber in sheet for lining chutes. Goodyear Tire & Rubber Co., Akron, O.

501,328. **Garalun.** Coated abrasive products. Armour & Co., Chicago, Ill.

501,351. **Rodform.** Rubber accelerators. R. T. Vanderbilt Co., Inc., New York, N. Y.

501,372. The words: **"Dura Rib"** and a representation of a circle containing the letters: **"KS."** Tires and tubes. Kelly-Springfield Tire Co., Cumberland, Md.

501,373. **Kelflex.** Tire repair patches. Kelly-Springfield Tire Co., Cumberland, Md.

501,409. **Cadets.** Prophylactic articles. Julius Schmid, Inc., New York, N. Y.

501,440. **Poncho.** Fabric impregnant. Patek & Co., San Francisco, Cal.

501,444. Representation of an oval containing the word: **"Joda."** Plastic and synthetic resins. Joseph Davis Plastics Co., Arlington, N. J.

501,484. Representation of a hexagon containing the letters: **"VBR."** Gums and resins. A. J. Wittenberg Corp., New York, N. Y.

501,530. **"The Beautee Invisibles."** Surgical hosiery. Surgical Products, Inc., Lowell, Mass.

501,554. **Resinex.** Plasticizer binder and extender. Harwick Standard Chemical Co., assignee of C. J. Harwick, doing business as Standard Chemical Co., Akron, O.

501,558. **Bancote Fabrics.** Plastic-coated cotton piece goods. Joseph Bancroft & Sons Co., Wilmington, Del.

Malayan Rubber Statistics

The following statistics for June, 1948, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	Sheet and Crepe: Singapore Export Proper	Sheet and Crepe: Malayan Union Trans-shipped	Sheet and Crepe: Malayan Union Direct Shipments	Latex, Concentrated Latex, and Revertex (Dry Rubber Cement): Singapore Export Proper	Latex: Malayan Union Trans-shipped	Latex: Malayan Union Direct Shipments
Australia	3,302	1,062	....	76	67	....
Belgium	215	10	481	23	6	29
Burma	3	....	1	....	....	....
Canada	1,697	382	1,355	217	....	....
Chile	259	....	31	....	....	....
Czechoslovakia	300	....	315	....	....	....
Denmark	102	30	153	9	2	7
Egypt	17	....	....	....	....	....
Finland	98	....	433	6	....	....
France	1,871	405	1,948	48	....	1
Germany	1,395	279	1,592	....	38	....
Hong Kong	1,214	7	94	....	....	....
Italy	770	401	599	19	3	66
Japan	30	....	710	....	....	....
Mexico	676	....	435	....	6	....
Netherlands	169	....	1,220	10	22	6
New Zealand	301	257	....	13	14	....
Norway	175	25	315	....	15	6
Other countries in South America	20	....	40	....	....	....
Poland	20	....	....	....	....	....
Russia	3,370	....	2,075	86	....	....
Spain	250	....	403	....	3	....
Sweden	805	10	559	....	9	3
Switzerland	23	....	....	....	....	....
Syria	2	....	....	....	....	....
Turkey	18	....	10	....	....	....
Union of India	574	....	370	....	....	....
Union of South Africa	966	92	260	1	1	....
United Kingdom	4,478	1,581	6,623	458	4	56
U. S. A.	16,805	2,264	16,634	965	....	1,687
TOTAL	39,925	6,805	36,656	1,931	190	1,861

Foreign Imports of Rubber in Long Tons

	Dry Rubber	Wet Rubber (Dry Weight)
Singapore Imports from		
Banka and Billiton	139	....
Brunei	123	3
Burma	13	2
Dutch Borneo	789	20
French-Indo China	...	100
Java	164*	26
North Borneo	948	30
Other countries in Asia	40	2
Other Dutch Islands	78	1
Rhio Residency	611	46
Sarawak	3,609	7
Sumatra	10,484	6,382
TOTAL	16,998	6,619

*Includes one ton sole crepe.

	Dry Rubber	Wet Rubber (Dry Weight)
Federation of Malaya Imports from		
Burma	526	85
Siam	598	19
Sumatra	1,080	1,573
TOTAL	2,204	1,677

Dealers Stocks	Tons
Penang	10,159
Province Wellesley	4,664
Up Country	33,604
TOTAL FEDERATION OF MALAYA	48,427
Singapore	49,907
TOTAL MALAYA	98,334
Port Stocks, Railway Godowns, Lighters, and Other Port Stocks	
Penang and Province Wellesley	7,226
Port Swettenham	1,967
Teluk Anson	240
TOTAL FEDERATION OF MALAYA	9,433
Singapore	9,259
	18,692
Estate Stocks	23,721
GRAND TOTAL, STOCKS	140,747
Production	
Estates	33,246
Small holdings (est.)	27,348
TOTAL	60,594
Consumption, Local	338

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co	Com.	$0.25	Sept. 30	Sept. 20
	Pfd.	1.75 q.	Sept. 30	Sept. 20
American Wringer Co., Inc	Com.	0.30 q.	Oct.	Sept. 19
Armstrong Rubber Co	Pfd.	0.59⅜ q.	Oct. 1	Sept. 16
	Com.	0.25 q.	Oct. 1	Sept. 16
Borg Warner Corp	Com.	1.00 q.	Oct. 1	Sept. 15
Canadian General Electric Co., Ltd	Com.	2.00 q.	Oct. 1	Sept. 15
Carborundum Co	Com.	0.50 q.	Sept. 30	Sept. 15
Denman Tire & Rubber Co	Com.	0.10 q.	Oct. 1	Sept. 24
	Pfd.	0.12½ q.	Oct. 1	Sept. 24
Dewey & Almy Chemical Co	Com.	0.35 q.	Sept. 20	Sept. 1
Faultless Rubber Co	Com.	0.25	Oct. 1	Sept. 15
Firestone Tire & Rubber Co	Com.	1.00	Oct. 20	Oct. 5
General Cable Corp	Com.	0.25	Nov. 1	Sept. 24
	1st. Pfd.	1.00 q.	Oct. 1	Sept. 24
	2nd Pfd.	0.50 q.	Oct. 1	Sept. 24
General Tire & Rubber Co	4¼% Pfd.	1.06¼ q.	Sept. 30	Sept. 20
	3¾% Pfd.	0.93¾ q.	Sept. 30	Sept. 20
	3¼% Pfd.	0.81¼ q.	Sept. 30	Sept. 20
Goodyear Tire & Rubber Co	Com.	1.00	Oct. 1	Sept. 10
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00	Oct. 1	Sept. 10
Jenkins Bros	Com.	1.50	Sept. 30	Sept. 17
	Com. N. V.	0.37½	Sept. 30	Sept. 17
	Pfd.	1.75	Sept. 30	Sept. 17
Johns-Manville Corp	Pfd.	0.87½ q.	Nov. 1	Oct. 11
Johnson & Johnson	Stock	5%*	Nov. 15	Oct. 25
	4% 2nd Pfd. Series "A"	1.00 q.	Nov. 1	Oct. 13
I. B. Kleinert Rubber Co	Com.	0.25	Sept. 10	Aug. 25
Mansfield Tire & Rubber Co	Com.	0.25 q.	Sept. 20	Sept. 10
	Pfd.	0.30 q.	Oct. 1	Sept. 15
Rome Cable Corp	Com.	0.15	Oct. 1	Sept. 10
	Pfd.	0.30 q.	Oct. 1	Sept. 10
Russell Mfg. Co	Com.	0.37½	Sept. 15	Aug. 31
Thermoid Co	Stock	5%	....	Sept. 15
Union Carbide & Carbon Corp	Cap.	0.50	Oct. 1	Sept. 3

*Subject to approval of stockholders.

Statement of India RUBBER WORLD

Statement of the ownership, management, and circulation, required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946, (39 U. S. C. 233) of India RUBBER WORLD, published monthly at Orange, Conn., for October 1, 1948.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: publisher, Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.; editor, Robert G. Seaman, 386 Fourth Ave., New York 16, N. Y.; managing editor, S. R. Hague, 386 Fourth Ave., New York 16, N. Y.; business manager, B. Brittain Wilson, 386 Fourth Ave., New York 16, N. Y.

2. The owner is: Bill Brothers Publishing Corp., Caroline L. Bill, Raymond Bill, Edward Lyman Bill, Randolph Brown, all at 386 Fourth Ave., New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. The two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. BRITTAIN WILSON
Business Manager

Sworn to and subscribed before me this 14th day of September, 1948.

[SEAL] JOSEPHINE M. CIERO
Notary Public, State of New York, Westchester Co.

(Commission expires March 30, 1949)

Compounding Ingredients Price Changes and Additions

Acrysol GS	lb.	$0.145	/ $0.22
Clearcarb	lb.	.1175	/ .1225
G-4	lb.	1.15	/ 2.70
G-11	lb.	3.50	
Kosmobile S	lb.	.07	/ .1125
Magnesia, extra-light, U. S. P.	lb.	.34	
K & M Neoprene Grade	lb.	.31	
Magnesium carbonate	lb.	.09	/ .135
Micronex MK II	lb.	.07	/ .1125
Monoplex DBS	lb.	.84	/ .85
DOS	lb.	.71	/ .72
Paraplex AL-111	lb.	.33	/ .3375
G-25	lb.	.76	/ .77
G-40	lb.	.4475	/ .4575
G-50	lb.	.45	/ .46
PT 101 Pine Tar Oil	gal.	.32	/ .43
Triton R-100	lb.	.145	/ .22
Vinylum # 45	lb.	1.50	/ 1.65

United States Rubber Statistics—June and First Half, 1948

(All Figures in Long Tons, Dry Weight)

	June, 1948						First Six Months, 1948					
	New Supply			Distribution			New Supply			Distribution		
	Production	Imports	Totals	Con-sumption	Exports	Stocks	Production	Imports	Totals	Con-sumption	Exports	Stocks
Natural rubber, total	0	62,437	62,437	53,428	718	110,681	0	336,046	336,046	309,869	3,183	110,681
Latex, total	0	2,288	2,288	2,273	0	9,137	0	17,387	17,387	12,100	0	9,137
Natural rubber and latex, total	0	64,725	64,725	55,701	718	119,818	0	353,433	353,433	321,969	3,183	119,818
Synthetic rubber, total	*39,387 †1,820	0	41,207	39,204	264	89,154	*238,726 †8,586	4,208	251,520	225,704	2,421	89,154
GR-S	*35,183 †263	0	35,446	30,439	38	‡71,467	*199,417 †1,936	4,172	205,525	176,703	368	71,467
Butyl	*2,183	0	2,183	5,370	§	9,569	*24,981	36	25,017	28,985	14	9,569
Neoprene	*2,021 †649	0	2,670	2,755	180	5,782	*14,328 †3,446	0	17,774	16,618	1,787	5,782
Nitrile	†908	0	908	640	46	2,336	†3,204	0	3,204	3,398	252	2,336
Natural rubber and latex, and synthetic rubber, total	41,207	64,725	105,932	94,905	982	208,972	247,312	357,641	604,953	547,673	5,604	208,972
Reclaimed rubber	22,504	0	22,504	23,786	927	35,898	138,750	0	138,750	140,704	5,900	35,898
GRAND TOTALS	63,711	64,725	128,436	118,691	1,907	244,870	386,062	357,641	743,703	688,377	11,504	244,870

* Government plant production.
† Private plant production.
‡ Includes 66 tons shipped for export, but not cleared.
§ Less than 0.5-long ton.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington 25, D. C.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, and Inventory—July-June, 1948; First Seven Months, 1948, 1947

	1948				1947, First Seven Months
	July	% of Change from Preceding Month	June	First Seven Months	
Passenger Casings					
Shipments					
Original equipment	1,927,718		1,724,546	12,093,594	11,192,484
Replacement	4,591,659		4,713,077	24,834,473	30,294,592
Export	40,599		43,304	383,263	966,871
TOTAL	6,559,976	+ 1.22	6,480,927	37,311,330	42,453,947
Production	5,516,349	−12.41	6,297,996	40,121,069	45,104,686
Inventory end of month	8,253,829	−11.47	9,323,461	8,253,829	4,283,995
Truck and Bus Casings					
Shipments					
Original equipment	450,919		464,035	3,271,875	3,328,762
Replacement	765,078		760,959	4,431,897	5,550,065
Export	89,971		120,764	698,524	959,106
TOTAL	1,305,968	− 2.96	1,345,758	8,402,296	9,837,933
Production	1,155,797	−10.15	1,286,309	8,806,178	10,705,682
Inventory end of month	1,952,751	− 7.53	2,111,699	1,952,751	1,554,193
Total Automotive Casings					
Shipments					
Original equipment	2,378,637		2,188,581	15,365,469	14,521,246
Replacement	5,356,737		5,474,036	29,266,370	35,844,657
Export	130,570		164,068	1,081,787	1,925,977
TOTAL	7,865,944	+ 0.50	7,826,685	45,713,626	52,291,880
Production	6,672,146	−12.03	7,584,305	48,927,247	55,810,368
Inventory end of month	10,206,580	−10.74	11,435,160	10,206,580	5,838,188
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,364,715		2,217,532	15,368,235	14,512,982
Replacement	4,364,685		4,421,266	23,426,015	27,007,544
Export	78,014		106,688	639,646	1,721,185
TOTAL	6,807,414	+ 0.92	6,745,486	39,433,896	43,241,711
Production	5,749,632	−14.40	6,716,400	40,499,490	47,309,188
Inventory end of month	8,760,344	−11.86	9,938,986	8,760,344	7,909,415

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc.

Rims Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	August, 1948
15" & 16" D. C. Passenger	
16x4.00E	239,379
16x4.50E	184,059
15x5.00E	79,123
15x5.00F	1,141
16x5.00F	21,831
15x5.50F	54,501
16x5.50F	4,156
16x4.00E—Hump	21,349
16x4.50E—Hump	6,600
15x4½-K	68,104
16x4½-K	24,372
15x5-K	357,144
16x5-K	153,872
15x5½-K	155,802
16x5½-K	15,966
15x6-L	125,355
16x6-L	31,544
15x6½-L	169,401
15x4½-K—Hump	237,163
15x5-K—Hump	126,577
15x5½-K—Hump	65,290
15x6-L—Hump	15,788
17" & Over	
18x2.15B	3,315
19x2.15B	1,900
17x3.62	426
Truck-Bus	
17x5.0	18,983
18x5.0	20,943
20x5.0	46,164
17x5.00R	12,097
20x5.00R	14,131
20x5.00S	33,977
17x5.5	8,996
20x5.50S	5,043
17x6.0	3,626
20x6.0	124,327
17x6.00S	80
20x6.00S	58,852
15x6.00T	852
20x6.00T	12,869
15x6.5	256
20x6.5	8,560
20x6.50T	12,244

RIM SIZE (Cont'd)	
15x7.0	502
20x7.0	3,526
22x7.0	507
24x7.0	330
20x7.00T	9,851
20x7.33V	20,276
24x7.33V	275
20x7.5	9,377
22x7.5	7,956
20x7.50V—Flat Base*	9,914
20x8.0	2,367
22x8.0	1,309
24x8.0	567
20x8.00V	12,932
Semi D. C. Truck	
15x5.50F	30,844
16x5.50F	2,017
16x6.50H	6,758
Tractor & Implement	
12x2.50C	30,147
12x3.00D	17,131
15x3.00D	15,363
16x3.00D	1,316
19x3.00D	1,785
36x3.00D	1,423
16x4.25KA	5,663
36x4.50E	2,924
18x5.50F	11,434
20x5.50F	2,975
24x5.50F	8,978
24x5.50R	3,247
20x8.00T	1,181
24x8.00T	10,067
32x8.00T	206
W5-24	2,674
W5-30	4,062
W6-24	2,763
W7-24	6,478
W8-24	18,755
W8-24 (H)	3,250
W8-36	4,016
W9-24	5,191
W9-28	6,123
W9-38	1,507
W10-28	6,914
W10-28 (H)	1,592
W10-36	340
W10-36 (H)	1,174
W10-38	1,775
W11-26	1,083
W11-28	292
W11-36	138
W11-38	856
DW10-38	3,590
DW10-42	395
DW11-24	1,465
DW11-28	1,135
DW11-30	948
DW11-38	6,956
DW12-26	1,278
DW12-30	5,164
DW12-34	2,947
DW14-30	1,277
DW16-26	493
Earth Mover	
24x13.00	193
24x15.00	38
25x15.00	111
25x17.00	10
TOTAL	2,874,289

*These rims, listed as 7.50V flat base, do not at present have Association approval. A "Not Branded" side ring is used on a "Branded" base made to 7.33V flat base rim dimensions.

U. S. Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber

	June, 1948		First Six Months, 1948	
	Quantity	Value	Quantity	Value
Unmanufactured, Lbs.				
Crude rubber	139,723,185	$25,338,739	752,036,100	$133,696,628
Rubber latex	5,125,417	1,335,173	39,729,668	9,707,389
Guayule	134,400	14,152	453,400	47,743
Balata	141,068	36,885	1,509,189	425,493
Jelutong or Pontianak	621,059	211,373	5,979,227	1,688,920
Gutta percha	100,435	41,277	687,886	445,218
Chicle	137,366	83,918	3,232,165	2,552,930
Synthetic rubber	2,010,201	230,684	6,549,856	1,088,340
Reclaimed rubber	50	5	2,950	581
Scrap rubber	1,914,797	42,090	7,221,802	142,213
Totals	149,907,978	$27,334,296	817,402,243	$149,795,455
Manufactured				
Tires: auto, bus, and truck . . . *no.*	709	$11,900	2,286	$35,342
Bicycle . . . *no.*	548	1,884	12,280	16,119
Other . . . *no.*	750	580	3,770	3,519
Inner tubes . . . *no.*	279	625	619	1,713
Rubber footwear:				
Boots . . . *prs.*	88	451	23,318	47,286
Shoes and overshoes . . . *prs.*	5,148	1,972	30,578	31,529
Rubber-soled canvas shoes . . . *prs.*	24,428	9,009	77,719	30,831
Rubber balls: golf . . *no.*	10,740	4,070	61,020	24,915
Tennis . . . *no.*	2,462	804	5,344	2,069
Other athletic . . . *no.*	154,124	15,867	170,718	17,931
Toys, except balloons	......	1,298	......	2,855
Hard rubber products	......	1,544	......	17,319
Rubberized printing blankets . . . *lbs.*	......	......	1,172	2,715
Rubber and cotton packing . . . *lbs.*	......	......	1,678	2,055
Gaskets and valve packing	......	129	......	901
Molded electrical insulators	......	......	......	179
Rubber belting . . . *lbs.*	5,842	8,320	7,741	11,826
Hose and tubing	......	6	......	409
Heels and soles . . . *lbs.*	......	......	7,412	1,869
Rubber golf ball centers or cores . . . *doz.*	......	......	85	242
Bands . . . *lbs.*	......	......	400	320
Instruments . . . *doz.*	......	......	90	187
Substitutes, advanced . . . *lbs.*	......	......	8,639,892	1,035,345
Soft rubber goods, except drug sundries	......	11,035	......	67,629
Other rubber products	......	673	......	1,499
Synthetic rubber products	......	6,849	......	12,282
Gutta percha manufactures . . . *lbs.*	12	61	12	61
Totals	......	$77,077	......	$1,369,047
Grand Totals, All Rubber Imports	......	$27,411,373	......	$151,164,502

Reexports of Foreign Merchandise

	June, 1948		First Six Months, 1948	
	Quantity	Value	Quantity	Value
Unmanufactured, Lbs.				
Crude rubber	1,608,608	$348,043	7,127,971	$1,589,397
Balata	46,396	18,428	74,032	46,757
Jelutong and gutta percha	10,000	2,300	12,000	2,600
Synthetic rubbers	2,000	400	2,000	400
Totals	1,667,004	$369,717	7,216,003	$1,639,154
Manufactured				
Rubber cement . . . *gals.*	......	......	1,825	$2,023
Shoes . . . *prs.*	......	......	144	588
Gloves and Mittens . *doz. prs.*	......	......	30	63
Drug sundries, other than syringes and water bottles	......	$2,530	......	21,103
Balloons	......	......	......	145
Rubber toys and balls	......	288	......	2,899
Tire casings and tubes, except auto . . . *no.*	6	627	25	940
Solid tires . . . *no.*	......	......	6	90
Hard rubber electrical goods, other than battery boxes . . . *lbs.*	......	......	165	53
Rubber and friction tape . . . *lbs.*	......	......	100	90
Balata belting . . . *lbs.*	......	......	14,607	14,208
Hose and tubing:				
Garden hose . . . *lbs.*	200	132	952	477
Other . . . *lbs.*	1,996	1,700	3,033	2,443
Rubber packing . . . *lbs.*	......	......	523	251
Latex and other compounded rubber for further manufacture . . . *lbs.*	......	......	47,520	14,000
Other rubber products	......	......	......	5,447
Totals	......	$5,277	....	$64,820
Grand Totals, All Rubber Reexports	......	$374,448	......	$1,703,974

Source: United States Department of Commerce, Washington, D. C.

Exports of Domestic Merchandise

	June, 1948		First Six Months, 1948	
	Quantity	Value	Quantity	Value
Unmanufactured, Lbs.				
Crude rubber	5,000	$3,000	58,367	$19,422
Chicle	51,601	19,830	383,315	183,742
Balata	1,005	3,367	13,505	51,417
Jelutong and gutta percha	......	......	596	635
Synthetic rubber:				
GR-S	85,507	26,547	824,000	191,994
Butyl	400	74	31,769	7,020
Neoprene	402,473	129,404	4,002,821	1,322,115
Nitrile	103,323	42,424	563,867	223,701
"Thiokol"	......	......	11,141	6,257
Polyisobutylene	19,316	5,860	46,214	14,696
Other	71,742	15,491	216,481	61,213
Reclaimed rubber	2,071,898	176,407	13,216,602	1,038,231
Scrap rubber	3,653,562	112,425	32,320,856	938,534
Totals	6,465,827	$534,829	51,694,534	$4,059,077
Manufactured				
Rubber cement . . *gals.*	28,268	$48,257	250,600	$343,787
Rubberized fabric:				
Auto cloth . . . *sq. yds.*	390,318	302,798	760,965	573,879
Piece goods and hospital sheeting . . . *sq. yds.*	77,777	49,703	529,854	397,920
Rubber footwear:				
Boots . . . *prs.*	6,735	27,031	207,831	656,468
Shoes . . . *prs.*	14,712	20,355	152,538	215,721
Rubber-soled canvas shoes . . . *prs.*	115,592	191,415	560,978	927,121
Soles . . . *doz. prs.*	22,417	68,085	186,716	418,445
Heels . . . *doz. prs.*	59,505	45,567	350,783	287,810
Rubber soling and top-lift sheets . . . *lbs.*	63,384	16,215	908,994	245,494
Rubber gloves and mittens . . . *doz. prs.*	17,989	52,235	90,317	272,943
Drug sundries:				
Water bottles and syringes . . *no.*	25,960	14,772	230,667	145,007
Other	......	215,067	......	1,519,322
Rubber and rubberized clothing	......	91,776	......	501,684
Balloons	......	85,238	......	572,105
Rubber toys and balls	......	51,705	......	299,081
Bathing caps . . . *doz.*	1,725	6,794	14,692	48,755
Rubber bands . . . *lbs.*	4,438	3,775	28,204	22,950
Erasers . . . *lbs.*	22,043	19,048	148,262	123,178
Hard rubber goods:				
Battery boxes . . . *no.*	21,490	29,943	261,880	287,581
Other electrical goods . . . *lbs.*	120,583	68,640	719,762	346,475
Combs, finished *doz.*	4,262	1,932	61,276	42,209
Other products	......	10,473	......	113,095
Tire casings: truck and bus . . . *no.*	101,676	4,561,596	622,673	26,494,628
Auto . . . *no.*	42,363	650,838	365,373	5,243,451
Inner tubes: auto, bus, and truck . . . *no.*	100,061	401,243	657,632	2,456,692
Other casings and tubes, except auto . . . *no.*	70,170	1,208,454	331,428	4,665,974
Solid tires: auto and truck . . . *no.*	7,288	208,532	83,710	2,282,017
Other . . . *lbs.*	7,609	3,547	427,312	213,345
Tire repair materials:				
Camelback . . . *lbs.*	152,432	45,103	800,237	229,864
Other . . . *lbs.*	168,631	87,766	1,112,316	563,771
Rubber and friction tape . . . *lbs.*	48,912	35,880	389,700	261,396
Balata belting:				
Auto fan belts . . *lbs.*	69,722	78,140	570,741	635,249
Other . . . *lbs.*	1,353,677	1,086,521	10,229,141	8,312,603
Hose and tubing:				
Garden hose . . . *lbs.*	144,308	33,456	781,863	247,693
Other . . . *lbs.*	626,178	453,370	4,024,094	2,922,071
Rubber packing . . . *lbs.*	293,877	175,790	1,095,765	864,713
Mats, flooring, and tiling . . . *lbs.*	826,509	203,155	3,888,212	1,001,323
Thread: bare . . . *lbs.*	44,350	56,175	240,145	373,150
Textile covered *lbs.*	11,281	26,086	106,234	240,271
Gutta percha manufactures . . . *lbs.*	7,340	3,126	49,320	42,673
Latex and other compounded rubber for further manufacture *lbs.*	241,756	91,940	2,190,551	796,090
Other rubber products	......	319,237	......	1,892,973
Totals	......	$11,150,809	......	$68,100,987
Grand Totals, All Rubber Exports	......	$11,685,638	......	$72,160,064

Recovery of Japanese Rubber Industry

Japan's rubber industry has led all others in postwar recovery, press reports indicate, and it is added that the present plant capacity at 90,000 tons annually is greater than in prewar years. One of the reasons for this rapid recovery is stated to be that a large stockpile of rubber stored by the Japanese militarists was readily available for peacetime uses. In 1947, Japan was permitted to import 17,000 tons of crude rubber, and she hopes to be able to get 30,000 tons this year. Peak prewar consumption of rubber was 75,000 tons.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.		*Replies forwarded without charge*

Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.

SITUATIONS OPEN

TECHNICAL SUPERINTENDENT FOR LATEX DIPPING AND molded products with established manufacturer on Eastern Seaboard. Must be entirely familiar and have extensive experience in latex dipping and blown gas ball production. Good opportunity for right party. Write in detail past experience and salary expected. All replies will be kept confidential. Address Box No. 215, care of INDIA RUBBER WORLD.

RESEARCH CHEMIST WANTED IN MILL MANUFACTURING latex impregnated papers. Experience in latex compounding or paper impregnation essential. Only top-quality applicants will be considered. State qualifications and minimum salary acceptable. Address Box No. 216, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—COMPOUNDING. EXPERIENCED IN industrial and mechanical rubber field, compounding and rubber adhesion to metals. Responsible position with excellent opportunity with company in the Midwest. Address Box No. 217, care of INDIA RUBBER WORLD.

WANTED: LATEX CHEMIST

A SUCCESSFUL, GROWING COMPANY EMPLOYING 180 people in small Ohio city has fine opportunity in development work for chemist or technically trained man with latex experience. Position will be in close association with officers and principals in company, with progress and ability given recognition. All inquiries acknowledged and treated in strict confidence. Please give complete information in first letter to Box 218, care of INDIA RUBBER WORLD.

RUBBER AND LATEX CHEMIST. B. S. DEGREE WITH TWO (2) or three (3) years experience in compounding rubber, synthetic rubber and latex. Knowledge of organic chemistry and rubber chemicals. Permanent position metropolitan Detroit. Give education, experience, and salary desired. Address Box No. 219, care of INDIA RUBBER WORLD.

PROCESS CHEMIST EXPERIENCED IN RUBBER COMPOUNDING and production of dipped items. Right man will eventually run rubber production of Michigan firm prominent in its field. Salary commensurate with ability. Our employes know of this advertisement. Address Box No. 220, care of INDIA RUBBER WORLD.

EXPERIENCED PRODUCTION SUPERINTENDENT FOR MECHANICAL rubber goods plant producing principally molded and extruded items. Plant employs approximately 1,000 and located close to Akron district. Write giving full details regarding experience and where acquired. Address Box No. 221, care of INDIA RUBBER WORLD.

SALESMEN WANTED: MIDWEST RUBBER PLANT MANUFACturing Mechanical and Sponge Rubber Products, has open territories for salesmen calling on the Industrial Trade. Commission basis. State qualifications and background in reply. Address Box No. 225, care of INDIA RUBBER WORLD.

SITUATIONS WANTED

COATINGS—LAMINATIONS—IMPREGNATIONS ADHESIVES

Consulting Technical Director of leading company for the past seven years will be available shortly due to reorganization. Textiles, papers, and metals. Rubbers, resins, lacquers, and colors.
Production or Development.
Metropolitan New York only.
Address Box No. 211, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—TIRE COMPOUNDER, M.S. DEGREE, thorough experience research, compounding, and factory processing tires, repair materials, and accessories. Also experience in mechanical goods. Extensive experience in raw materials and pigment development and technical sales on compounding ingredients. Present employer discontinuing operations. Address Box No. 212, care of INDIA RUBBER WORLD.

TECHNICAL SALES, DEVELOPMENT, CHEM. ENG., 28, 5 years' extensive experience in product development, sales, research of water emulsions and solvent solutions of synthetic, natural, reclaimed rubbers, vinyl polymers for adhesives, coatings, saturants, binders; dipped goods. Desires responsible position. Address Box No. 213, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—AVAILABLE FOR CONSULTATION AND special problems or part-time work. Experienced in large and small plant operations with variety of products from compounding and mechanical aspects. Will travel anywhere in world. Headquarters Akron, Ohio, area. Address Box No. 214, care of INDIA RUBBER WORLD.

DEVELOPMENT AND PRODUCTION CHEMIST—OVER 20 years' experience in fabric coating, paper treatment, with latex, natural and synthetic rubber, all types resins; extensive plastic and rubber molding; textile processing. Also diversified chemical, technical research work. Broad engineering background. Executive management, production, and technical service experience. Patents registered. Age 49; B.S. Chem.; available short notice. Address Box No. 223, care of INDIA RUBBER WORLD.

CHEMIST, M.S., 1941—7 YEARS' EXPERIENCE COMPOUNDING and processing natural rubber, vinylite, and all types of synthetic rubber for molded, extruded, and calendered products. New England location with a small- or medium-sized company preferred. Address Box No. 224, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 137)

United States Rubber Industry Employment, Wages, Hours

	Prod. Workers, 1000's	Prod. Workers Index	Prod. Workers Payroll Index	Avg. Weekly Earnings	Avg. Weekly Hours	Avg. Hourly Earnings	Consumers Price Index
All Rubber Products							
1939	121	100.0	100.0	$27.84	36.9	$0.754	99.4
1943	194	160.3	263.9	....	....	....	133.5
1947	....	....	....	....	....	....	159.2
May	211	174.6	347.5	55.30	39.0	1.416	156.0
June	207	170.9	342.3	55.49	39.1	1.419	157.1
July	200	165.1	331.2	55.74	38.6	1.445	158.4
Aug	203	167.9	337.6	55.92	38.7	1.445	160.3
Sept	203	168.1	348.3	57.76	39.9	1.447	163.8
Oct	208	171.7	354.4	57.62	40.1	1.438	163.8
Nov	210	174.0	361.4	57.99	39.9	1.454	164.9
Dec	212	175.3	373.6	59.47	40.9	1.454	167.0
1948:							
Jan	210	173.5	354.9	57.33	39.7	1.444	168.8
Feb	208	172.0	337.3	54.70	38.5	1.421	167.5
Mar	204	168.9	320.6	53.24	37.8	1.408	166.9
Apr	198	163.8	312.8	53.44	37.8	1.413	169.3
Tires and Tubes							
1939	54.2	100.0	100.0	$33.36	35.0	$0.957	....
1943	90.1	166.1	265.7	....	....	....	....
1947							
May	119.3	220.0	399.3	61.12	37.6	1.622	....
June	117.7	217.0	396.1	61.35	37.7	1.615	....
July	115.1	212.3	389.5	62.06	37.9	1.640	....
Aug	116.6	214.0	396.0	62.15	37.8	1.640	....
Sept	112.5	207.5	397.9	64.75	38.9	1.661	....
Oct	114.4	211.0	398.0	63.78	38.7	1.647	....
Nov	115.1	212.2	407.5	64.86	38.9	1.661	....
Dec	114.8	211.7	412.1	65.74	39.5	1.658	....
1948:							
Jan	113.5	209.2	388.4	62.72	38.2	1.646	....
Feb	111.6	205.8	355.9	58.22	36.0	1.613	....
Mar	108.8	200.7	330.6	55.54	34.8	1.599	....
Apr	104.6	192.9	323.6	56.54	35.3	1.603	....
Boots and Shoes							
1939	14.8	100.0	100.0	$22.80	37.5	$0.607	....
1943	23.8	160.5	268.8	....	....	....	....
1947							
May	22.8	153.6	331.2	48.27	40.7	1.185	....
June	21.4	143.9	317.1	49.62	41.4	1.198	....
July	20.1	135.1	290.0	48.46	40.5	1.187	....
Aug	18.9	127.2	268.4	47.23	39.9	1.183	....
Sept	21.0	141.6	314.4	49.92	41.8	1.194	....
Oct	21.7	146.1	331.7	51.28	42.4	1.211	....
Nov	22.0	147.9	322.4	49.26	40.6	1.213	....
Dec	22.5	151.4	367.1	54.72	44.5	1.231	....
1948:							
Jan	22.5	151.5	342.8	51.08	42.1	1.214	....
Feb	22.8	153.8	345.0	50.65	41.7	1.214	....
Mar	22.6	152.4	347.0	51.42	42.2	1.219	....
Apr	22.1	149.0	333.9	50.59	41.7	1.214	....
Other Rubber Goods							
1939	51.9	100.0	100.0	$23.34	38.9	$0.605	....
1943	79.9	154.1	255.8	....	....	....	....
1947							
May	81.0	156.3	325.5	48.81	40.6	1.201	....
June	79.5	153.2	320.1	48.95	40.5	1.209	....
July	76.8	148.0	304.9	48.22	39.1	1.232	....
Aug	79.6	153.5	321.5	49.17	39.7	1.237	....
Sept	81.9	157.8	338.3	50.40	40.9	1.234	....
Oct	84.0	162.0	352.3	51.03	41.4	1.232	....
Nov	86.1	166.0	362.2	51.27	41.0	1.252	....
Dec	87.7	169.1	379.9	52.93	41.8	1.261	....
1948:							
Jan	86.8	167.4	368.3	51.79	41.1	1.260	....
Feb	86.5	166.9	366.2	51.33	40.8	1.258	....
Mar	85.7	165.3	356.2	50.60	40.4	1.251	....
Apr	84.0	161.9	347.1	50.05	40.0	1.258	....

SOURCE: BLS, United States Department of Labor, Washington, D. C.

Tensile Tester

(*Continued from page 106*)

the pawls and retains the maximum tensile value.

The use of a new stylus driving mechanism is incorporated into the recording of test values. The glass covered spark stylus is attached to a rigid carriage bar which moves through four polished center guides that rotate on ground pivot points. The machine end of the carriage bar is a Scotch crosshead and is connected to the pendulum by two precision ball bearings. This design equally spaces load recordings across the Tensilgram, thus increasing the accuracy of modulus readings, and minimizes the influence of the recording equipment on the test results.

Tensilgrams for recording tensile strength with a maximum of 1,500% elongation of the specimen can be supplied for all capacities. The complete tester has a height of 92 inches, width of 45 inches, stroke of 35 inches, and weighs 392 pounds. It is available in 150-pound capacities of 6,000 and 4,000 p.s.i. tensile, and 68.04-kilogram capacities of 221 and 181.4 kg/sq. cm. tensile.

OUR NEW
MACHINERY
HYDRAULIC PRESSES
CUTTERS—LAB. MILLS
BRAKES—LIFT TABLES
MILLS—MIXERS
SUSAN GRINDERS

NEW MACHINERY REBUILT

OUR 5-POINT
REBUILDING PROCESS
1—INSPECTION
2—DISASSEMBLY
3—REBUILDING
4—MODERNIZING
5—GUARANTEE

LOS ANGELES CALIFORNIA · AKRON OHIO · CHICAGO ILLINOIS · STOUGHTON MASSACHUSETTS

L. ALBERT & SON
COAST-TO-COAST
TRENTON, N. J.—MAIN OFFICE

CLASSIFIED ADVERTISEMENTS
Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 1 WATSON-STILLMAN HYDRO-PNEUMATIC ACcumulator, low and high (3,000# pressure) with pumps and all accessories: 4—42" x 42" 8-opening, Hydraulic Presses with 24" rams, pumps, and motors. 1—48" x 48", 3-opening, Hydraulic Press with 4—10" rams, several other various sizes. 1—5' x 24' Vulcanizer with quick-opening door. 1 Royle #½ Tuber. Also Mills, Calenders, etc. Send us your inquiries. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y. Telephone: BArclay 7-0600.

FOR SALE: BAKER-PERKINS 200 GAL. & 100 GAL. DOUBLE arm jack. Mixers, also 50, 20, 9 & Lab. 0.7 gals.: Royle #2 Perfected Extruder: Thropp 16" x 36", 2-roll Rubber Mill, also Lab. size, 30", 36", 40", 42", 48", 60", 84", sizes: Rubber Calenders 30", 54", & 60": Rubber Tubers 2" to 6": Large stock Hydraulic Presses from 12" x 12" to 42" x 48" platens, from 50 to 500 tons: Hydraulic Pumps & Accumulators: HPM 4-oz. Injection Molding Machine, other sizes 1 to 16 oz.: Stokes & Colton single punch & rotary preform Tablet Machines, ½" to 2": Banbury Mixers: Kettles: Tanks: Rotary Cutters: Grinders & Crushers: Mixers: Pumps: etc. SEND FOR SPECIAL BULLETIN.

WE BUY YOUR SURPLUS MACHINERY
STEIN EQUIPMENT CO.
90 WEST STREET, NEW YORK 6, N. Y.

FOR SALE: 2—40 HP—720 RPM—TYPE MT-346—60-CYCLE 3-phase 220-volt GE Motors.
1—25 HP—900 RPM—Type KT-332—Form B—60-cycle 3-phase 220-volt GE Motor.
All complete with compensators and in perfect operating condition. Address Box No. 222, care of INDIA RUBBER WORLD.

FOR SALE: 2 THROPP 16" x 30" TWO-ROLL MILLS: 5 HEAVY-duty double-arm jacketed mixers, 50 and 150 gal. working capacity, 9 Rotary 16-punch pellet presses. PERRY, 1524 W. Thompson St., Philadelphia 21, Pa.

NO. 3-A FARREL-BIRMINGHAM BANBURY MIXER ABOUT TEN years' old, complete with drive and 100 H.P. A.C. motor. Also, 18" x 48" Rubber Mill, complete with 75 H.P. A.C. motor and drive. Machines in good operating condition. Inquire: TINGLEY-RELIANCE RUBBER CORP., 903 Ross Street, Rahway, New Jersey.

FOR SALE
RUBBER MANUFACTURING MACHINERY
BY OPERATING COMPANY REDUCING
RUBBER DIVISION TO MAKE ROOM
FOR EXPANSION.

12—Single ram presses (14-16 and 18" rams). 1—Double ram press — 24" x 72" platen. 2—Boilers 25 & 50 HP. 2 — High pressure W&S Pumps. 2 — Large tubers. 1 — Small tuber. Calender with grid. 3 — Mills (20" to 60"). 4 — Boiler feed pumps. 1 — Low pressure reciprocating pump. 1 — 27 foot Vulcanizer. 1 — 6 foot Vulcanizer and other miscellaneous equipment.

ALL EQUIPMENT IN OPERATING CONDITION AND WILL MERIT YOUR INSPECTION. INQUIRIES INVITED. WRITE BOX NO. 210, CARE OF INDIA RUBBER WORLD.

An International Standard of
Measurement for

Hardness • Elasticity
Plasticity of Rubber, etc.

Is the DUROMETER and ELASTOMETER (23rd year)

These are all factors vital in the selection of raw material and the control of your processes to attain the required modern Standards of Quality in the Finished Product. Universally adopted.

It is economic extravagance to be without these instruments. Used free handed in any position or on Bench Stands, convenient, instant registrations, fool proof.

Ask for our Descriptive Bulletins and Price List R-4 and R-5

THE SHORE INSTRUMENT & MFG. CO.
Van Wyck Ave. and Carll St., JAMAICA, NEW YORK
Agents in all foreign countries

MOLDS
WE SPECIALIZE IN MOLDS FOR
Heels, Soles, Slabs, Mats, Tiling and Mechanical Goods

MANUFACTURED FROM SELECTED HIGH GRADE STEEL BY TRAINED CRAFTSMEN, INSURING ACCURACY AND FINISH TO YOUR SPECIFICATIONS. PROMPT SERVICE.

LEVI C. WADE CO.
79 BENNETT ST. LYNN, MASS.

Economical **NEW** Efficient

Mills - Spreaders - Churns
Mixers - Hydraulic Presses
Calenders

...GUARANTEED...

Rebuilt Machinery for Rubber and Plastics

LAWRENCE N. BARRY
41 Locust Street Medford, Mass.

(Classified Advertisements Continued on Page 139)

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	July, 1948		July, 1947	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Balata . . . lbs.	100	$ 352	1,052	$ 3,784
Crude rubber . . .	6,782,905	1,245,810	1,928,554	422,117
Latex . . . lbs.	405,719	110,392	459,186	134,387
Rubber, powdered and waste . . . lbs.	153,600	27,677	570,000	14,227
Recovered . . . lbs.	1,498,000	121,138	2,177,300	175,629
Synthetic and substitute . . . lbs.	71,300	17,652	131,500	34,959
TOTALS . . .	8,911,624	$1,523,021	5,267,592	$ 785,103
PARTLY MANUFACTURED				
Comb blanks of hard rubber . . .	. . . .	$ 3,178	. . . .	$ 1,462
Hard rubber in rods or tubes . . . lbs.	243	288	1,236	1,165
Rubber thread, not covered . . . lbs.	4,533	4,089	2,611	4,679
TOTALS . . .	4,776	$ 7,555	3,847	$ 7,306
MANUFACTURED				
Belting . . .	. . . .	$ 67,853	. . . .	$ 59,959
Boots and shoes of rubber, n.o.p . . . prs.	22,762	33,804	4,075	9,185
Canvas shoes with rubber soles . . . prs.	84	193	1,181	2,532
Cement . . .	. . . .	39,004	. . . .	32,891
Clothing of waterproofed cotton or rubber . . .	. . . .	2,749	. . . .	5,186
Druggists' sundries . . .	. . . .	44,026	. . . .	32,103
Gaskets and washers . . .	. . . .	41,046	. . . .	31,965
Gloves . . . doz. prs.	779	4,744	1,334	4,611
Golf balls . . . doz.	5,036	20,707	973	4,605
Heels . . . prs.	13,930	3,039	910	144
Hose . . .	. . . .	46,493	. . . .	40,604
Hot water bottles . . .	. . . .	5,701	. . . .	7,593
Inner tubes, n.o.p . . . no.	552	1,843	6,275	12,575
Bicycle . . . no.	16,682	7,766	1,858	1,331
Liquid sealing compound . . .	. . . .	11,873	. . . .	3,266
Mats and matting . . .	. . . .	25,955	. . . .	49,885
Nursing nipples . . . gross	1,274	3,526	384	1,415
Packing . . .	. . . .	18,653	. . . .	15,078
Raincoats . . . no.	308	3,538	885	3,849
Tires, pneumatic, n.o.p. . no.	999	35,339	14,140	195,587
Bicycle . . . no.	4,161	6,136	14,424	12,597
Solid for automobile and motor trucks no.	52	1,864	27	442
Other . . .	. . . .	13,198	. . . .	5,442
Tire repair material . . .	. . . .	7,940	. . . .	13,448
Other rubber manufactures	. . . .	317,005	. . . .	307,225
TOTALS . . .	. . . .	$ 763,995	. . . .	$ 853,518
TOTAL RUBBER IMPORTS	. . . .	$2,294,571	. . . .	$1,645,927

Exports of Crude and Manufactured Rubber

	July, 1948 Quantity	July, 1948 Value	July, 1947 Quantity	July, 1947 Value
UNMANUFACTURED				
Crude rubber . . . lbs.	5,084,022	$ 853,954	3,473,922	$ 642,686
Waste rubber . . . lbs.	959,700	10,427	1,670,400	17,803
TOTALS . . .	6,043,722	$ 864,381	5,144,322	$ 660,489
PARTLY MANUFACTURED				
Soling slabs of rubber . . lbs.	1,560	$ 435	1,316	$ 341
MANUFACTURED				
Bathing caps . . .	. . . .	$	. . . .	$ 31
Belting, n.o.p . . . lbs.	206,136	151,421	236,502	158,770
Belts, fan . . .	. . . .	9,177	. . . .	3,026
Boots and shoes of rubber, n.o.p. . . . prs.	211,174	316,831	230,061	359,306
Canvas shoes with rubber soles . . . prs.	44,535	51,311	121,422	93,301
Clothing of rubber and waterproofed clothing . . .	. . . .	26,192	. . . .	48,569
Heels . . .	66,777	745	61,012	4,386
Hose . . .	. . . .	56,698	. . . .	60,234
Inner tubes for motor vehicles . . . no.	37,044	102,736	39,278	100,060
Soles . . . prs.	288	54	2,239	390
Tires, pneumatic for motor vehicles . . . no.	55,068	1,468,645	37,653	664,381
Other . . . no.	1,189	27,398	4,645	7,174
Wire and cable, copper, insulated . . .	. . . .	117,272	. . . .	225,515
Other rubber manufactures	. . . .	25,166	. . . .	47,161
TOTALS . . .	. . . .	$2,353,646	. . . .	$1,772,304
TOTAL RUBBER EXPORTS	. . . .	$3,218,462	. . . .	$2,433,134

Rubber Price for Brazilian Manufacturers

A resolution published on July 9, 1948, puts local rubber goods manufacturers on a more competitive basis with foreign producers. From that date Brazilian manufacturers will pay world market prices for locally grown rubber used in producing export goods. But the higher local price for crude rubber will still apply if the products are intended for home consumption.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY & SUPPLIES FOR SALE (Continued)

FOR SALE: BANBURY MIXER BODIES, No. 9, SPRAY OR jacketed types, completely rebuilt. Interchange for your worn Banburys, save time. Write, wire or phone Interstate Welding Service, exclusive specialists in Banbury Mixer rebuilding, 914 Miami Street, Akron 11, Ohio.

MACHINERY & SUPPLIES WANTED

MACHINERY WANTED: TO GRANULATE SLABS OF PLASTIC insulating materials. Capacity 300 to 500 lbs. per hour. Address Box No. 226, care of INDIA RUBBER WORLD.

TEETHING RINGS—WANTED

Dependable Source for substantial, steady volume.
No job lots.

QUALITY SUNDRY CO., Inc.

1165 Broadway MUrray Hill 6-0689 New York 1

WANTED — Large engineering firm wishes to acquire several complete Rubber plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Box 1220, 1474 Broadway, New York 18, N. Y.

WANTED FOR ENGLAND

Sole manufacturing rights for any mass production article in Ebonite or Rubber preferably connected with the Accumulator industry, by the largest manufacturers in England of moulded Ebonite accumulator cases under American patents.

EBONITE CONTAINER CO., LTD.

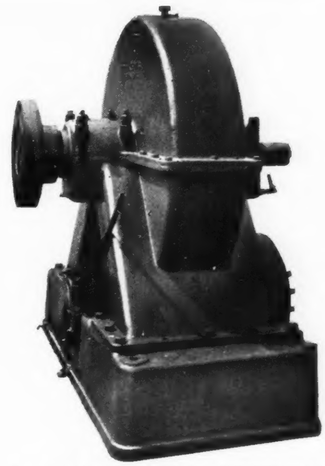
Belle Isle — York Way
London, N. 7, England

WANTED

Chemicals — Colors — Pigments
Resins — Solvents — Glues — Plasticizers
Other Raw Materials

CHEMICAL SERVICE CORPORATION

80 Beaver Street, New York 5 Hanover 2-6970



FALK MILL LINE VERTICAL REDUCTION UNITS

Used, excellent condition. 6½ to 1 reduction. 200 HP. Designed and built for heavy duty, long service. Good running condition. Priced for quick sale and delivery.

A. Schulman Inc.

MACHINERY DIVISION

790 E. TALLMADGE AVENUE • AKRON 9, OHIO

GET MORE FOR YOUR SURPLUS EQUIPMENT

List it with our bureau
And Sell Directly to the next user.

All Rubber Manufacturers Get Our Offerings Regularly. They need such units as

RUBBER MILLS CALENDERS
BANBURY and W & P MIXERS
EXTRUDERS VULCANIZERS
HYDRAULIC PRESSES

For Quicker Action and Better Price
Send Full Details and YOUR Price to

EQUIPMENT FINDERS BUREAU

6 Hubert Street New York 13, N. Y.

AIR BAG BUFFING MACHINERY
STOCK SHELLS HOSE POLES
MANDRELS

NATIONAL SHERARDIZING & MACHINE CO.

868 WINDSOR ST. HARTFORD, CONN.

Representatives
Akron San Francisco New York

GUARANTEED REBUILT MACHINERY

IMMEDIATE DELIVERIES FROM STOCK

MILLS, CALENDERS, TUBERS HYD. PRESSES, PUMPS, MIXERS
VULCANIZERS, ACCUMULATORS CUTTING MACHINES, PULVERIZERS

UNITED RUBBER MACHINERY EXCHANGE

NEW ADDRESS: 183-189 ORATON ST. CABLE "URME" NEWARK 4, N. J.

Twelve Months' Index to Volumes 117-118, October, 1947—September, 19[illegible]

INDIA RUBBER WORLD

BILL BROTHERS PUBLISHING CORP.
386 Fourth Avenue, New York 16, N. Y.

Volume 117-118 — October, 1947, to September, 1948

Ja=Jan.; F=Feb.; Ma=Mar.; Ap=April; My=May; Je=June; Jl=July; Au=August; S=Sept.; O=Oct.; N=Nov.; D=Dec.

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Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Etablissements Defontaine, Ave. Costes & Lebrix, Nantes (Loire Inferieure), France: automobile accessories and garage equipment.

Ettore Dupanloup, 39 Via Montenotte, Savona, Italy: automotive equipment.

S. J. de Haas, 8 Monseigneur Wilmerstraat, Boxtel, Netherlands: toys, games, combs, fountain pens, and novelties.

Sadik al-Timini, Timini Bldg., Rashid St., Baghdad, Iraq: tires, inner tubes, refrigerators, radios, electric appliances, paints.

Giuseppe Quartarone, 31 Via dell Porte Nuove, Florence, Italy: automotive accessories and replacement parts, including tires and batteries.

Cortina y Cia., Aguiar 609, Habana, Cuba: rubber play balls, rubber dolls, toy balloons, and similar rubber articles.

Miguel Pons, S. A., 592 Camana (Casilla 2581), Lima, Peru: tires.

Zundel & Hampele, 6a, quai Kellermann, Strasbourg, (Bas-Rhin), France: dyes, oxides, coal-tar products, plastic materials.

David Shafferman, representing Egyptian Plastics & Electrical Industries, S. A., Inc., P. O. Box 812, 4 Place Ismailler, Alexandria, Egypt: plastic machinery and raw materials.

Pradith Suvanapradip, representing Suvan Vanit Co., Ltd., 693 New Road, Bangkok, Siam: rubber belting.

Marcel Benjamin Mosse, 14 Blvd. Guynemer, Villa "Les Gardenias," representing Galeries de la Croisette Department Store, Rue d'Antibes, both of Cannes A. M., France: Lastex bathing trunks, rubberized garments.

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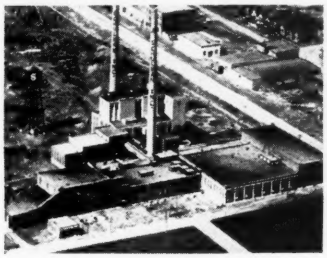

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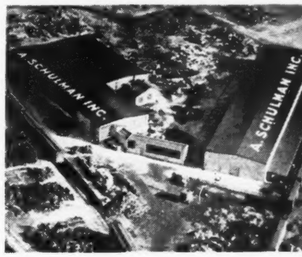

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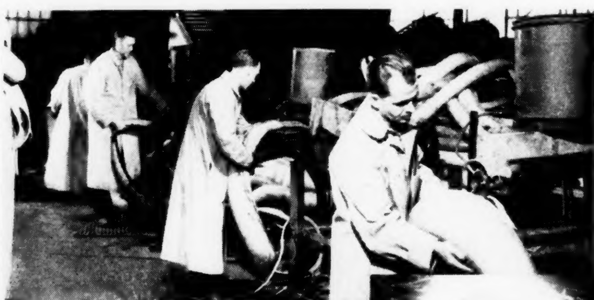

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